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**DEVELOPMENT OF CORPORATE AGILITY
OF THE CONSTRUCTION COMPANY**

Doctoral Thesis



RIGA TECHNICAL UNIVERSITY

Faculty of Engineering Economics and Management

Institute of economics and business

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CONSTRUCTION COMPANY**

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Annotation

The Doctoral Thesis is devoted to the field of construction, studying the influence of corporate agility on the performance of the construction company.

Several researches within this Doctoral thesis were conducted. It was proved that there is a demand for the corporate agility within the construction industry. Factors affecting operational activities as well as corporate agility of the construction company were determined. The methodological approach for the determination of corporate agility of the construction company was developed and validated within this work.

The theoretical frameworks were studied, in-depth interviews were performed in order to analyse primary and support activities of the construction company, including its functions and structure. The findings of the research were confirmed by construction industry experts with international experience.

The Thesis covers the influence of the corporate agility and its importance for the modern construction company.

Keywords: construction, construction company, corporate agility, organizational behaviour, corporate governance, operations of the construction company, functions of the construction company, structure of the construction company, primary and support activities of the construction company, level of the corporate agility, determination of the corporate agility, factors affecting corporate agility

List of Acronyms and Abbreviations

A.G.I.L.I.T.Y. – Agent, Guidance, Information gathering, Learning, Interview, Truth, Year(s)

CEO – chief executive officer

CFO – chief financial officer

CG – corporate governance

CIO- chief information officer

CLO – chief legal officer

CTO – chief technology officer

EU – European Union

EC – European Commission

JV – joint venture

HR – human resources

OB – organizational behaviour

PM – project manager

PESTEL – Political, Economic, Social, Technological, Environmental, Legal factors

TS – technical secretary

USA – United States of America

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Introduction

Modern business environment forces companies to face new challenges on the daily basis. Tough competition, dynamic business environment, demand for a quick decision making, and technological innovation do not allow companies to take any break, to free up some time to look around and think. In this dynamic environment, keeping a competitive advantage requires a company's management to develop organizational practices that can sense a changing environment and quickly adjust to the unpredicted developments. In the fast-growing business environment, the terms "flexible management" or "corporate agility" are becoming increasingly popular.

Having become a modern concept, a "corporate agility" is launched a growing number of international companies in different industries. IT and High-tech sectors lead the process, while some "heavy" and "old fashioned" industries, including construction or manufacturing, lag behind.

Traditionally, industries with disproportionate reliance on heavy machinery, work force and materials are not prepared to quick changes. Today's challenges, namely rapid growth of population, urbanization, overloaded infrastructure, growing competition, overwhelming data flow, higher quality and safety demands, clients' wishes to have cheaply operated and multifunctional buildings, etc. force construction companies to change, to adapt themselves to new conditions and new environment.

The construction industry is struggling with a segmentation, low productivity, high level of all kinds of regulatory issues (De Witt et al 2005) and slow pace of modernization. These factors do not allow construction companies properly and timely react and face the challenges of modern business environment.

According to the Global Construction Market Report (Business Wire a Berkshire Hathaway Company, 2021), the construction market is expected to reach \$16.6 trillion by 2025, it has a significant influence on the employment and wealth data due to the number of people the industry employs, which is almost 8% of workers around the globe.

Such dynamic business environment requires the company to show great flexibility in order to maintain its competitive advantages. New organizational practices, a new corporate structure, new patterns of organizational behaviour and investments in human capital become a daily challenge for any entity. As a result, organizational agility has become a

modern tool, which allows to strengthen and develop a company within this changing environment.

These daily challenges do not leave room for thinking and discussions, the intuition steps to the front, and rapidly changing external and internal factors on the one hand force managers to make quick decisions, on the other, they require revisions and adjustments in a non-stop mode. The key term is a quick reorganization and adaptation to new conditions, whilst minimum time and resources are used. All mentioned above force the construction sector to face not an easy choice of either reorganizing towards agility or stepping out of the operational scene.

It should be noted that the construction industry is struggling with implementation of modern theories and approaches, where corporate agility is a rare topic for the construction companies that base their operations on the century old management models. Today we face entirely new working conditions and challenges than we did a hundred years ago. These, in turn, require an open mindset, broad thinking, and an agile approach both from each employee individually and the organization as a whole. Most of the processes prevailing in modern construction companies include a multitude of complex internal and external interactions within rapidly changing environments. Thus, any rigid frameworks of corporate operations cannot be applied anymore.

The agile approach, broad thinking, quick reorganization abilities, effectiveness and employee motivation, while keeping eye on quality and terms, are a set of tools and challenges a construction company uses and faces daily. It is a fact that corporate agility is a modern trend that plays a key role in the survival of a construction company.

The research hypothesis:

There is a demand for corporate agility in the construction industry. Sub-hypothesis:

SH1: A well-balanced corporate agility in a construction company may significantly improve its performance.

SH2: Detecting the level of corporate agility is an essential step for the overall improvement, successful development, and operation of a construction company.

The aim of the research is to prove that corporate agility affects performance of the construction company and to develop a methodological approach for determination and improvement of corporate agility level in the construction company.

The research **object** is a construction company. The research object will be studied and investigated in order to understand how corporate agility affects and assists in the development, management and operation of the companies in the construction industry.

The research **subject** is corporate agility of a construction company. The study will focus on the impact of corporate agility on the research object, including evaluation of the former.

In order to reach the proposed aim, the following research objectives are set:

1. To define the term 'corporate agility';
2. To establish whether there is a demand for corporate agility in the construction industry;
3. To determine the factors that affect operational activities of construction companies;
4. To review corporate agility within support and primary activities of the construction company;
5. To determine the factors affecting corporate agility of the construction company;
6. To develop the methodological approach for the determination and improvement of the level of the corporate agility of the construction company;
7. To validate the tools of the methodological approach for the determination and improvement of the level of the corporate agility of the construction company.

Taking the above mentioned into account, the following research questions were formulated:

1. Is there a demand for the corporate agility in the construction industry?
2. What are the factors that affect operational activities and corporate agility of a construction company?
3. How to determine the level of corporate agility of the construction company?

The following theses are brought forward for the defense:

1. There is a demand for corporate agility within the construction industry.
2. There is a vast number of complicated factors affects operational activities of the construction company.
3. There is a possibility to determine and evaluate importance of factors affecting corporate agility of the construction company.

4. There is possibility to develop methodological approach for determination and improvement of corporate agility level in the construction company.

The Main Scientific Contributions and Novelty of the Doctoral Thesis:

- The main factors affecting operational activities of a construction company were determined. Author performed a profound content analysis to determine main factors that affect operational activity of the construction company.

- definitions of the terms “corporate agility”, “organizational behaviour”, “corporate governance”, and “construction company” were overviewed. For the course of dissertation, the author offers definition “corporate agility”, while other definitions were developed to show the author’s standpoint, and do not have significant impact on the scientific branch.

- The factors affecting corporate agility of the construction company were determined. In-depth interviews with the top managers of companies of the construction industries from several countries were conducted to explore the main factors affecting operational activities of a construction company. The diversity of the respondents allowed to achieve comprehensive results.

- The methodological approach for determining and improving the level of corporate agility in a construction company was developed. It is concluded - construction industry is lacking extensive managerial and organizational studies. The developed methodological approach is validated within one of the largest construction companies in the Baltic Region.

- For the first time in the Baltic States implementation and deployment of corporate agility for the construction company was studied within doctoral research.

Practical Contribution and Key Benefits of the Doctoral Thesis:

- The comprehensive analysis of the operational, organizational and strategical aspects of the construction company was performed.

- The recommendations for the improvement of the performance of the construction company were elaborated.

- The methodological approach for determination and improvement of corporate agility level in the construction company was developed.

- The AGILITY model was developed and validated.

Structure and volume of the Doctoral Thesis

The Doctoral Thesis consists of an introduction, four main parts, conclusions, and recommendations. The volume of the Thesis is 229 pages, excluding appendices. The content of the Doctoral Thesis has been illustrated by 47 figures and 28 tables. The Doctoral Thesis has 18 appendixes. The bibliography contains 354 reference sources. The content of the Thesis covers both theoretical and empirical study. The author has published six articles about the topic of the study and its results, all of which have been published either in scientific journals or peer-reviewed scientific proceedings, the articles were cited in the scientific data basis. Results of the Doctoral Thesis were presented at seven international scientific conferences, approved during research and study process.

Chapter one is devoted to the discussion of the concept of corporate agility through three prisms: cultural aspects, corporate governance, and organizational behaviour. Hofstede's cultural dimensions theory is used as a basis for the cultural discussion. A direct correlation was found between cultural aspects/ habits and economical success of a particular state. The differences in organizational behaviour and corporate governance affected by cultural factors shall be brought forward. Comprehensive analysis of the corporate governance was performed. Several theories were discussed, and main models were reviewed to understand their impact on the performance and corporate agility of the construction company. The concept of organizational behaviour was thoroughly discussed and studied. The definitions suggested by many researchers were extended to the analysis of the three (micro, meso and macro) levels the organizational behaviour should focus on. Finally, the concept of corporate agility was revealed, discussed, and defined. Several academic theories provide a solid basis for both academic and practical studies of corporate agility. Further studying and developing on already existing theories, other researches of corporate management, organizational behaviour and lifecycles, allowed the author both to define the term of corporate agility, and to review the impact of any transformation in a company. At the end of the chapter author presented results of his empirical study confirming the demand for the corporate agility from the construction industry participants. 508 respondents from the industry answered the author's developed questionnaire, for the results analysis an "Alteryx" software, an Analytic Process Automation platform, was used.

Chapter two explores both a building industry and a construction company. The author defined the research object – a construction company. The deep historical and statistical

overviews are provided. Historical and statistical data supplemented the results of the comprehensive research were main factors that affect operational activities of the construction company were determined. There are 13 significant factors, generated from 667 codes, which were determined using the systematic literature review and qualitative content analysis. Each factor includes a number of attributable codes (frequency) and a respective percentage out of total number of codes. The author found that there are factors that have versatile effect and have a different origin. The determined 13 significant factors affecting operational activities of the construction company are grouped in three major domains – internal, external and reciprocal.

There were several topics reviewed in Chapter three that focuses on corporate agility of the construction company. The structure of the construction company was studied and discussed. The highly thorough and in-depth analysis of both primary and support activities of the construction company was conducted. Each activity was discussed in detail, risks and problems were identified and recommendations for improvement provided. Author has singled out the role of corporate agility in strategy, general management, corporate governance and organizational behaviour of the construction company. These integral and important components of the corporate agility were further analysed. All these terms were closely observed, including aspects of conflict solving, hierarchy of goals, Katz skills model, organizational performance and change model, ethics, choices model, Ashby law, deep analysis of organizational behaviour at three levels, and cognitive map of big team. Summarizing the problems and challenges of the agility in strategy, general management, corporate governance and organizational behaviour, author would like to outline the importance of balance and common sense when implementing any organizational change. Rapidly changing environment, internal challenges, limitations set by peculiarities of particular industry or market, cultural clashes, etc. – all should be evaluated, to avoid chaos. However, both empirical and academic studies prove that substantial changes in the way the organizations are led and managed are essential.

Author conducted the field research and presented its results at the end of the Chapter three. The main objective of the field research was to detect major factors that affect corporate agility of the construction company through interviews with industry's professionals.

In order to determine factors that affect corporate agility author performed interviews (face to face or via conference calls) with 15 CEOs, CFOs, CLOs, Construction and HR directors, senior project managers from 4 countries and 11 construction companies. The participants were asked to list at least 5 factors that affect the corporate agility of their company. 84 factors were identified.

Based on factors detected in the previous chapters, other empirical research and academic studies in Chapter four author developed a methodological approach for determination and improvement of corporate agility level in the construction company. It should assist the company to identify its weak, from corporate agility point of view, functions and provide guidelines for improvement of these weaknesses. The approach is based on both theoretical and practical findings. Methodological Approach for the Determination and Improvement of the Corporate Agility's Level within a Construction Company included a seven-step "A.G.I.L.I.T.Y." concept and a questionnaire, comprised of 68 questions, allowing to detect the level of corporate agility of the construction company, were developed. The given questionnaire shall help to pinpoint the real situation of the company and all its functions, relationship among colleagues and different departments, the thoughts of subordinates about superiors, and employees about organizations, to explore the level of corporate agility of the company and much more. In other words, it will include a lot of sensitive data, that most of the employees will not be willing to share, especially with the top management of the company. There might be a variety of reasons why they would behave that way either due to fear for their job, or peculiarities of their personality, but crucial point of any valuation, analysis, conclusions, and further improvement program is the true and reliable data received during the initial phase. That is why author developed methodological approach for determination and improvement of corporate agility level in the construction company, its analysis and development of the recommendations. The questionnaire was successfully implemented and validated within one large global construction company. The potential improvements and basis for the further research were discussed as well.

The last Chapter is dedicated to conclusions and recommendations.

Limitations of the Research.

The analysis of the construction industry of the EU for the years 2010-2020 was carried out. Due to the partial unavailability of statistical data, data for the last available year was used for some indicators. The author decided to focus on Baltic States as integral part of EU

(including the UK) market –based, midsize and large construction companies. The building material manufacturers and design companies were not reviewed separately. According to European Commission recommendation 2003/361/EK, if a company's turnover exceeds 10 million EUR, it has total balance sheet of at least EUR 10 million and/or employs more than 50 people it is considered as midsize entity, while companies with turnover exceeding 50 million, with the total balance sheet of at least EUR 43 million and/or number of employees more than 250 **considered as large entities**. There is no sense to analyse small entities since due to their size they lack sophisticated bureaucracy and are agile by their essence. The niche players (narrowly specialized companies and companies that develop construction products or technological solutions, materials producers/sellers for the construction industries, or pure maintenance companies) are not part of the research.

Theoretical and methodological foundation of the Doctoral Thesis.

Author used vast number of academic sources as a theoretical and methodological foundation for his Doctoral Thesis. Among these sources are well-known academic theories, normative documents and acts, scientific literature, methodological and statistical documents. The main sources are listed below:

Porter 1985, 1987, 1996, Mintzberg, 1979, Vroom, 1964, Maslow, 1943, Weber, 1948, Hofstede, 2011, Whittington 2001, Rumelt 2011, Adizes 1999, 2014, Maassen, 2002, Mayo, 1933, McGregor 1960, Andrews, 1980, Katz, 1974, Ashby, 1956, Galbraith, 1973, Kondalkar , 2007, Griffin and Moorhead, 2014, Wagner & Hollenbeck , 2010, Burnes, 2017, EU and OECD states laws and regulations, Dong, 2013, Janne et al, 2018, Merritt & Ricketts 2000, Bentall et al, 1999, Sun et al, 2013, Ritz, 1994, Mackey et al, 2021, Nunnally, 2007, Langford & Male 2001, Oberlender, 2000, Pearce, 2003, Naumanen, 2019, Ribeirinho et al, 2020, Carassus , 2004, De Valence, 2010, Eldring et al. 2012, Barbosa, et al, 2017, Rajasekhar , 2017, Harvey & Ashworth, 1993, DeWitt et al, 2005, Stevens, 2007, Kauskale, Geipele, Vanags, Lepkova, 2017, Leung & Olomolaiye, 2010, Flanagan, 1994, L'huillier, 2014, Ungureanu, 2012, Morck, 2005, Yao, 2009, Kendall, 1992, Veldman et al, 2016, Yeoh, 2007, Chipper, 2010, McDonough, 2002, Jacobs , 2018, Minner, 2006, Simon & Lingham, 2008, Dailey, 2016, Gelfand et al 2006, Early et al, 1999, Yamaguchi, 2005, Kessler 2013, Lorsch & Tierney 2002, Kast & Rosenweing, 1979, Parr 2015, Van Erde & Thierry 1996, Parsons 1951, 1974, Sull 2010, Aghina et al 2015, Singh, et al., 2013, Sherehiy & Karwowski, 2014, Haneberg, 2011, Teece et al, 2016, Verdu & Gomez-Gras, 2009, McKinsey Agile Tribe 2017, De Smet & Aghina 2015, Erande & Verma, 2008, Jadoul

et al 2020, Hull, 2012, Sennett, 2006, Carpenter, 2001, Parada, 2020, Brockmann et al 2010, 2013, Cardoso et al, 2015, Brooks & Spillane, 2016, Šiškina, et al 2009, Aghina et al 2020, Wright et al, 1992, Meyer & Marion, 2016, Duckworth, 2016, Koeleman et al 2019, Stevens 2007, Kähkönen & Sexton 2005, Motzko et al 2013, Geipele et al 2018, Coates 2014, Kessler, 2013, Martin, 2017, Fedotova 2019, Shadan, et al 2012, Kragh et al 2018, Geipele et al 2019, Bruno et al, 2011, Gottanka and Meyer 2012, Cappelli and Tavis, 2018, Merono-Cerdan et al, 2007, Doloreux et al, 2015, Mergel, 2016, Eisenhardt & Martin, 2000, Yitmen and Akyel, 2005, Jardine, 2007, Ilveskoski and Niittymäki, 2015, Khalfan et al, 2005, Pukite et al 2017, Kang et al 2006, Pal & Panteleo, 2005, Tuutti 2005, Böde et al 2020, Verdenhofs et al 2019, Cagliano et al, 2006, Campbell & Sankaran 2005, Vrijhoef 2011, Oberhelman et al, 2010, Elmualim, 2010, Girmscheid, 2005, Rintala et al, 2005, Accardi – Petersen, 2011, Burke & Litwin, 1992, Kanter, 1989, Lafey and Martin, 2013, Atkinson & Moffat, 2005, Egan, 2002.

International scientific publications on the research topic.

The results of the Doctoral Thesis have been reflected in eight scientific publications, cited in Scopus, WoS and other data basis.

Rostoka, Z., Locovs, J., Gaile-Sarkane, E. (2019), "Open innovation of new emerging small economies based on university-construction industry cooperation", *Journal of Open Innovation: Technology, Market, and Complexity*, 5 (1), art. no. 10.

Locovs, J., Gaile-Sarkane, E., Suija-Markova, I., Rostoka, Z., Rubina, L. (2018) "Enterprise agility - Modern term or future trend for successful company development?" *WMSCI 2018 - 22nd World Multi-Conference on Systemics, Cybernetics and Informatics, Proceedings*, 3, pp. 13-18.

Locovs, J., Gaile-Sarkane, E. (2020), "Factors that affect corporate agility of a construction company", *IMCIC 2020 - 11th International Multi-Conference on Complexity, Informatics and Cybernetics, Proceedings*, 2, pp. 111-116.

Locovs, J., Gaile-Sarkane, E. (2022) "Factors Affecting Operational Activities of a Construction Company", *IMCIC 2022 - 13th International Multi-Conference on Complexity, Informatics and Cybernetics, Proceedings*, 2, pp. 183-188.

Locovs, J., (2018). "Agile legal department a myth or key to success" RTU 59th International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2021)", October 18, 2018.

Locovs, J., (2019). "Corporate agility: a fashion trend or way to long-term success" RTU 60th International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2021)", October 11, 2019.

Locovs J., Gaile-Sarkane E., (2021), "Dimensions of corporate agility within the construction Industry" Proceedings of Selected Papers, Czech Republic, Brno: Brno University of Technology, Faculty of Business and Management, pp. 67–77.

Locovs J., Gaile-Sarkane E., (2021), "The corporate agility's barometer of the construction company", RTU 62nd International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2021)", October 14-15, 2021, pp 21-31.

Presentation and approbation of research results at international scientific conferences:

WMSCI 2018 - 22nd World Multi-Conference on Systemics, Cybernetics and Informatics, July 8-11, 2018, USA

SOItmC & DEMI of the UNINA 2018 Conference with IFKAD at Naples, Italy on June 26-29, 2018

IMCIC 2020 - 11th International Multi-Conference on Complexity, Informatics and Cybernetics, March 10-13, 2020, USA.

IMCIC 2022 - 13th International Multi-Conference on Complexity, Informatics and Cybernetics March 8-11, 2022, USA.

RTU 59th International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2018)", October 18, 2018. Latvia.

RTU 60th International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2021)", October 11, 2019. Latvia

Workshop. Brno University of Technology, Faculty of Business and Management. December 10, 2021. Czech Republic.

RTU 62nd International Scientific Conference "Scientific Conference on Economics and Entrepreneurship (SCEE'2021)", October 14-15, 2021.

1. The concept of corporate agility

1.1. Theoretical frameworks for corporate agility

Corporate agility is a modern trend that overtakes the business world. IT sector was the first to start talking about it as an industrial business concept, but now an increasing number of industries and multinational corporations implement agile approach in the corporate structures, business behaviours and operations. According to Pal & Pantaleo (Pal and Pantaleo, 2005) agile enterprises must adapt to continually changing business environments to survive in the long term. To do so they have to combine 'best and next' business practices. Best practices ensure efficiency; next practices really lead to competitive advantages:

The origins of agility in the organizational management context can be traced to the developers of a ***Contingency Theory***. Contingency theorists opposed the notion of the one principal structural form. Instead, they sought to identify the alternative structural form that was most appropriate under a specific set of conditions (Mintzberg, 1979). The U.S. author Fred Fiedler (Fiedler, 1964) used the term contingency while working on the leadership theory. His work focused on different groups' performance under the impact of diverse conditions. Fiedler analysed the relation within the group to its leader and how the performance is affected by the leadership style. As a result, he concluded that there is no one best leadership style, while the effectiveness of a leader is based on the situation. Further development of the Contingency Theory was summarized by Jay Galbraith (Galbraith, 1973) while making two basic assumptions. First, there is no one best way to organize. Second, any way of organizing is not equally effective (Betts, 2003). This was summarized into the core assertion of the contingency **theory that there is no one best way to lead people or to design an organization including its structure and processes**. Rather, the central premise is that the choices which are made must fit the situation faced (Kessler, 2013). According to Lorsch & Tierney (Lorsch & Tierney, 2002) contingency theory deals with relationship within organization, the environment the organization is acting in, and performance of the organization in that specific environment. In other words, the decisions or actions taken in one particular situation by one particular group or entity, most probably are made to suit and

cannot be “blindly” copied or implemented. Kast & Rosenweing (Kast & Rosenweing ,1979) **found that the contingency view seeks to understand the inter-relationship within and among sub-systems as well as between the organization and its environment, and to define patterns of relationship and configuration of variables.** It emphasizes the multivariate nature of organizations and attempts to understand how organizations operate under varying conditions and in specific circumstances. Contingency views are ultimately directed towards suggesting organizational designs and managerial actions most appropriate for specific situations.

Kondalkar (Kondalkar, 2007) highlights the following **features of the Contingency Theory:**

- Management action is contingent on certain actions outside the system or the sub system;
- Organizational action should be based on the behaviour of action outside the system so that organization can be integrated with the environment;
- Due to the unique nature of organization–environment relationship, no action can be universal. It varies from one situation to another;
- Internal functions of the organization are generally consistent with the technology, demand placed on the organization by the society, external environment and needs of the members of the organization.

Through analysis of the Contingency Theory and other authors’ assessment of a Contingency theory, **the author of this research concludes that approach suggests suitable alternatives for those managerial actions, which are influenced by external and internal environment such as organizational design, strategy formulation, decision systems, leadership styles and organization improvement.**

Another important theory agility emerged from is ***Expectancy Theory***. It focuses on the components needed for a successful alignment of individual goals with organizational objectives. According to Parr (Parr, 2015) “we pay special attention to anything that violates our expectations. This is because we have an innate need to figure out whether the incident signals a threat or a positive development.”

Expectancy theory was initially presented by Victor H. Vroom in 1964 (Vroom,1964). It rests on the assumption that largely behaviour is motivated, and goal directed. Goals induce forces on people to engage in courses of action, which they believe will result in their attainment. Expectancy theory does not deal with and does not explain the motives that drive people to achieve a particular goal.

This was stated formally in two propositions. The first proposition asserts that the force exerted on a person to perform an activity, or a set of activities is a function of the attractiveness or valence of a goal multiplied by the expectancy that the activity will result in the attainment of that goal.

This proposition is useful in predicting behaviour, such as deciding how much effort and energy is to be invested to carry out a particular work. When applied to work motivation, it asserts that the amount of effort that a person puts into the achievement of a performance goal is dependent on two necessary conditions—that the goal is attractive, and that the person believes that it can be achieved through effort.

The second proposition maintains that outcomes acquire valence to the degree to which they are believed to be instrumental to the achievement of one's goals. In effect, a perceived "steppingstone" to the achievement of goals become goals, the means become ends (Kessler, 2013).

In his book Vroom (Vroom,1964) made the following definitions of factors that shape his **Expectancy theory**:

- Valence is defined as all possible affective orientations toward outcomes, and it is interpreted as the importance, attractiveness, desirability, or anticipated satisfaction with outcomes;
- Instrumentality is defined as an outcome- outcome association, and it is interpreted not only as a relationship between an outcome and another outcome but also as a probability to obtain an outcome;
- Expectancy is defined as a subjective probability of an action or effort leading to an outcome or performance expressed.

According to Van Erde & Thierry (Van Erde & Thierry, 1996) Vroom's models do not yield higher effect sizes than the components of the models. This suggests that the models

lack validity. At the same time, it is commonly known fact that many studies were performed incorrectly from the original theoretical point of view and in terms of the data analysis.

The following **basic assumptions of Expectancy theory** shall be used in this research:

- Individuals are driven by private goals;
- Organizations have to align corporate goals with the private objectives of employees and other stakeholders;
- Individuals always expect attainment as a result of their action to achieve a particular objective;
- Since Expectancy theory says nothing about the motives that shape human behaviour and decision-making process, other theories or models should be considered to cover this aspect. For instance, **Maslow's Theory of Human Motivation**.

Maslow (Maslow, 1943) defined five levels human driving needs that have a growing priority, meaning that only if person satisfied the lowest level of his/her needs, he/she searches to glut the next one.

The author shall use the following basic assumptions of **Human Motivation Theory** in his work:

- Individuals shall not step on the next level of pyramid before the needs of the previous level are satisfied and secured/guaranteed;
- Not all people are willing to satisfy the self - actualization of needs via work or a career;
- People value sense of security and belongingness, and are ready to accept even negative changes at workplace as long as certain level of security is ensured;
- Belongingness and respect are important motivation factors.

Based on A. Maslow's theory many motivational theories were developed, one of which, for example, is achievement motivation theory. Identification of needs allows any manager to recognize the motives of each employee and use his/her motivation together with other skills and talents to achieve corporate goals via employee's personal goals. The alignment of personal and corporate goals and expectations, as well as the

methods(mechanisms) with which these should be changed and adjusted shall be discussed later.

The Bureaucracy theory was developed by Max Weber. According to Burnes (Burnes, 2017). Weber had no real managerial experience. His theory is based on his observations and studies of the human history. He concluded that ruling elites in different parts of the world and different time-periods had to sustain their power by gaining legitimacy and development of administrative apparatus to enforce their dominance. For Weber, legitimacy is central to almost all systems of authority. “Its [bureaucracy’s] specific nature, which is welcomed by capitalism, develops perfectly as bureaucracy is ‘dehumanised’, the more completely it succeeds in eliminating from official business, love, hatred, and all purely personal, irrational, and emotional elements which escape calculation” (Weber, 1948).

Below are the main characteristics of bureaucratic organization, as suggested by Max Weber, which are also described and analysed by other authors:

- Division of labour (described also by Sarker&Khan ,2013);
- Clear hierarchical authority structure, where each lower office is controlled by upper level. It contradicts with matrix structure (Described also by Burnes, 2017; Adizes,2014; Parsons ,1974);
- Formal and unbiased procedures, detailed rules, and regulation (described also by Van der Voet, 2014; Adizes, 2014);
- Division according to functions. Functions, level of independence/autonomy and duties are clearly defined and specialized. (Described also by McAuley et al, 2007);
- Clear career tracks for employees (described also by McAuley et al, 2007);
- Operation according to previously set plans and forecasts (described also by Burnes 2017);
- Impersonal relationship (described also by Sarker & Khan, 2013; McAuley et al., 2007);
- Internal focus – minimization of external interruption (described also by Adizes, 1999; de Waal & Martiz, 2019);
- Previously agreed remuneration/penalties (described also by Dischner, 2015).

It is important to remember that Weber's bureaucratic organization is highly affected by Prussian feudal heritage and political and economic situation in Weimar's republic in the first third of the previous century. The Industrial revolution that took place not long before required strict and structured order in the factories to make production process as efficient as possible. Seeing a disorder of Weimar republic Weber tried to suggest solution for his own country to escape from the economic chaos that ruled there in that time.

However, after the Second World War the focus in the **Western economies started to shift towards people**. Socialist ideas of individual protection in Europe and competitive environment in the United States both were heavily affected by cultural-social-economical processes that changed the business outlook, where people were not perceived as soldiers or robots anymore. At that time plenty of studies dealt with the needs and aims of the individual. Maslow's hierarchy of needs depicted it in a very vivid way. One of the first critics of the bureaucracy theory was Warren Bennis, an advisor to four US presidents. Bennis (Bennis, 1966) claimed that the age of classical bureaucracy is over. It is being replaced by flexible and human focused organizations, which encourage personal growth and development. Bennis argued that every age develops an organizational form appropriate to its time. Bureaucracy was, in his view, appropriate for the first two-thirds of the twentieth century but not beyond that. He believed that bureaucracy emerged because its order, precision and impersonal nature acted as the correct antidote for the personal subjugation, cruelty, nepotism and capriciousness that passed for management during the Industrial Revolution. Later studies of contingency theorists that, in turn, emerged into a corporate agility term, proved these statements.

These four theories teach us that there are many volatile environments with variety of external and internal factors that affect organizations. There is no one correct, unified way of acting in a changing environment. No successful organization can afford not to react to the factors abovementioned, instead it should adapt itself to the new challenges internally and externally in the most effective and timely manner possible. In other words, organizations must be agile.

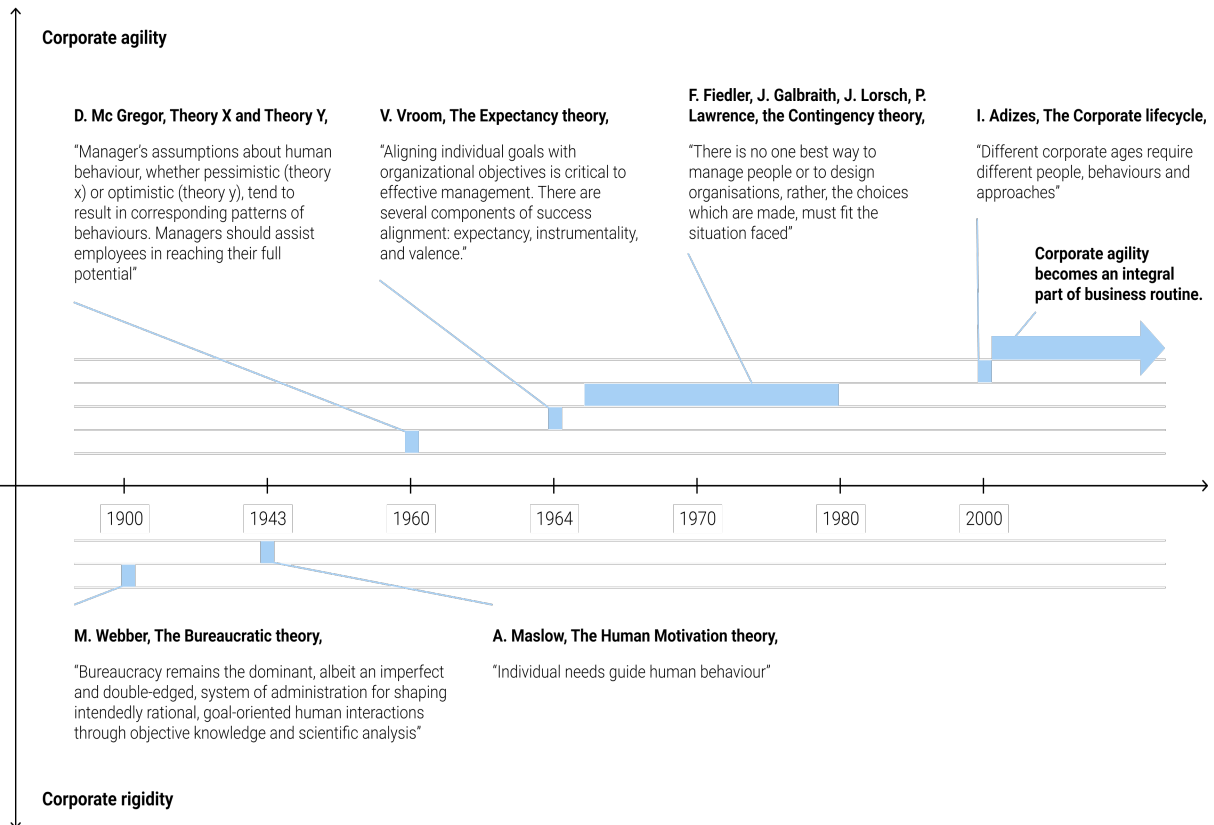


Figure 1.1 The evolution of the theories supporting corporate agility (developed by author)

Numerous academic studies using measures such as stock price volatility, the mortality of firms, the persistence of superior performance, the frequency of economic shocks, and the speed of technology dissemination, have concluded that volatility at the firm level increased somewhere between two- and fourfold from the 1970s to the 1990s (Sull, 2010).

Adizes (Adizes, 2014) found that, younger organizations show more flexibility, while as they mature the controlability increases at the expense of flexibility. As a result, the organization increasingly loses touch with its environment, the environment changes faster than organizations ability to adapt. He determines "Prime" as the optimal position in the lifecycle, where the organization finally achieves a balance between control and flexibility. In other words, we can summarize that there is no one universal way of structuring and managing an organization. Furthermore, the company's personnel should apply different approaches and patterns reflecting the factors and challenges that affect an organization or its part from ever changing internal and/or external environments.

The abovementioned theories demonstrate that together with the evolution of society and human self-development, the business environment has developed as well. **The strict bureaucratic approach and "the conveyer production" are being replaced by management**

practices that consider both the uncertainty and unpredictability of business environment as well as individual role and needs of an employee. This corporate evolution **leads to the development of corporate agility** that should provide an answer to the modern challenges. Therefore, the definition and the concept of corporate agility needs to analysed.

1.2. The definition of corporate agility

According to analysis of scientific publications agile attributes were originally conceived as core concepts of agile manufacturing. The researchers of the Lacoocca Institute at Lehigh University were the first to coin the concept of agile manufacturing in 1991 (Ã, 2010). Around the same time, the agile approach began to raise in prominence in software development resulting in the publishing of Agile Manifesto in 2001 (Singh, et al., 2013). The authors of the Agile Manifesto were united by the belief that in order to succeed in the new economy, to move aggressively into the era of e-business, e-commerce, and the web, companies must rid themselves of make-work and arcane policies and place individuals and interactions over processes and tools, working product over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Manifesto for Agile Software Development, 2001).

A recent study by Aghina et al (Aghina et al,2015) demonstrates that the concept of agility has spread across different industries and sectors, the attributes of agility have been extended to the company's business processes and the entire supply chain. According to this study, the author of the promotional research concludes, that the agile companies design their structures having both a **backbone of stable elements and dynamic capabilities to reflect unexpected challenges.**

Despite various definitions for terms "agility" and "enterprise agility", found in literature, there is no commonly accepted definition and no consensus on the meaning of the terms. Relative to the products, cooperation, organization, people and knowledge, agility has been defined as important dimension related to enterprise operation. It is a complex, multi-dimensional and context-specific concept (Appelbaum et al., 2017).

Wendler & Stahlke (Wendler & Stahlke, 2014) found that agile work approach is important for companies in today's competitive and quickly changing environment with benefits including early returns on investment, improved product quality, and enhanced client

relationships. In addition, Grant (Grant, 2013) claims that team members of organizations with a high level of agile proficiency tend to be happier, further engaged, and inventive, creating increased value for both the company and its customers.

In the course of the research, the author has found numerous **definitions for term (corporate) agility**. Several examples are as below:

- **Agility** is an enterprise's ability to quickly respond and adapt in response to continuous and unpredictable changes in internal and external business environments (Mengoni, Germani, & Mandorli, 2009).
- **Agility** is the ability to function and compete within a state of dynamic, continuous and often anticipated change (Appelbaum et al., 2017).
- **Agility** is the ability to sense environmental changes (Appelbaum et al., 2017) and act proactively to these changes (Sherehiy & Karwowski, 2014).
- **Agility** is the efficiency with which organizations respond to continuous change by consistently adapting. (Haneberg, L. 2011).
- **Agility** is the capacity of an organization to efficiently and effectively redeploy/redirect its resources to value creating and value protecting (and capturing) higher yield activities as internal and external circumstances warrant (Teece et al. 2016).
- **Agility** is the organizational flexibility with subsets of internal and external strategic, structural, operational and managerial flexibility (Verdu & Gomez-Gras, 2009).
- **Agility** is ability to sense and react quickly to change in the environment through anticipation, innovation and learning (Charbonnier-voirin, 2011).
- **Agility** is a strategic ability of the organization to adapt and adjust rapidly to unanticipated and sudden changes in the market(Shereniy B., 2008).
- **Agility** is an ability quickly and efficiently to reconfigure strategy, structure, processes, people and technology toward value-creating or value -protecting opportunities. (McKinsey Agile Tribe,2017).
- Enterprise **agility** is a complex, multidimensional, and context-specific concept, comprised of the ability to sense environmental change and quickly respond to unpredicted change by flexibly assembling resources, processes, knowledge, and capabilities. (Yang & Liu,2012).

- **Agility** is the ability of an organization to renew itself, adapt, change quickly, and succeed in a rapidly changing, ambiguous, turbulent environment. (De Smet & Aghina, 2015).
- **Agility** is the ability to respond to unpredictable changes with quick response and profitability. (Erande & Verma, 2008).
- **Agility** is the capacity to identify and capture opportunities more quickly than rivals do. (Sull, 2010).

It is evident from the definitions that there are **common elements** in all of them, namely **environment or ecosystem** (where the company/organization operates), **challenges, time limits, organization synergy, ability to react immediately, optimization of resources,** etc.

Searching for the definitions of corporate agility no definitions specifically related to construction companies were found. However, found common elements are applicable also for the companies acting in the construction industry. For the purpose of this research author suggested the following definition applicable for the corporate agility of the construction company, which was discussed during the interviews with the construction industry experts (see Appendix 1 – in accordance with the General Data Protection rules information about the participants is codified):

Corporate agility is a company's ability to identify and effectively react to internal and external opportunities and/or challenges and/or unpredicted changes within the shortest possible time frame, through the maximization of cross organizational synergy and the minimal resources' (financial, HR, etc,) usage for such transformative activities.

For the explanation of the words and phrases included in the definition, Merriam-Webster dictionary (www.merriam-webster.com, 2022) is used.

A company - an association of persons for carrying on a commercial or industrial enterprise or those members of a partnership firm whose names do not appear in the firm name. Author's additional explanation: for a construction industry it is common to call enterprises, organizations and firms in united way – construction companies;

An ability - the quality or state of being able;

To identify – to ascertain the identity of someone or something that is unfamiliar or unknown;

Effectively – in an effective manner;

To react -to change in response to a stimulus;

Internal - of, relating to, or occurring on the inside of an organized structure (such as a club, company, or state);

External -arising or acting from outside;

An opportunity -: a good chance for advancement or progress;

A challenge -a stimulating task or problem;

Unpredicted - unforeseen;

A change – alteration, transformation or substitution;

Short - not extended in time;

Possible - being what may be conceived, be done, or occur according to nature, custom, or manners;

Time frame - a period of time especially with respect to some action or project

A maximization – making the most of;

Cross – involving mutual interchange;

An organization - an administrative and functional structure (such as a business or a political party; personnel of such a structure;

Organizational - of or relating to an organization;

A synergy -a mutually advantageous conjunction or compatibility of distinct business participants or elements (such as resources or efforts);

Minimal – the least possible;

A resource -a source of supply or support, an available means;

A usage -the action, amount, or mode of using;

Transformative -causing or able to cause an important and lasting change in someone or something;

An activity - the quality or state of being active, behaviour or actions of a particular kind.

The main aspect of added value of this definition is cross organizational synergy that allows to use minimal resources responding to intrinsic and/or extrinsic challenges.

Apart from the academics mentioned above there are plenty of researchers (Adizes, Gothelf, Mergel, Francis, Atkinson & James Moffat, Aghina, De Smet & Weerde, Pal & Pantaleo, Cappelli and Tavis, etc.) that consider agility as an essential, relevant and modern corporate pattern that must be deployed by any organization to stay competitive. Moreover, the

scholars argue that there is a transition from classical management schools to the new, e.g. agile management approach.

According to reserches described above, **agility is** not only a set of particular rules sent down from the board and written in some sacral corporate scripts of quality management that nobody reads. On the contrary, it is the **ability of the company to adapt and adjust quickly all its elements, goals and core competences to the unstopably and hardly predictably intrinsic and extrinsic dynamic challenges**. There is a relatively limited room for the company to run as a maturely structured enterprise on the one hand and keep “start up’s” flexibility of a ‘start-up’ and flat structure on the other. The main goal of the top management is to set the path and lead the company to that position. It may appear as a long climbing route for the start-up or as a painful reoragnization for the over-bureaucritized entity, **but corporate agility is the key to the overall success of the company.**

1.3. Main components of corporate agility

Corporate agility is very complex approach which requires more detailed analysis, therefore different components of the corporate agility should be identified and analysed. Aghina et al. (Aghina et al., 2020) (see chapter 1.4) determined that technology, structure, processes, strategy and people create five operating dimensions of an agile organization.

Jadoul et al. (Jadoul et al., 2020) in its turn found that companies considering a large-scale transformation in turbulent times must bear in mind four important issues:

- **Don’t skip the ABCs.** - Before diving into the transformation, spend enough time together up front, as a top team, to think about your aspirations, the basics of agile work, and the commitment it requires to succeed. What are the targets you want to meet and the value you hope to create? How will you know when you have met your goals? Finally, the top team must commit itself to spending the time and energy needed to drive the transformation—even through tough times and with no excuses.
- **Start with frontrunners.** Although some organizations have launched radical “big bang” agile transformations, most approach agile in steps or launch limited pilots—for example, in one country. That approach requires a company to choose areas in which it can show real gains and then to quickly launch teams that demonstrate

what agile really means. These frontrunners help build an operating model that works in remote settings.

- **Drive holistic change, especially its human aspects.** Agile is not about new reporting structures or Post-it notes. Change at the enterprise level—for example, the way an organization does budgeting, manages performance, and runs the tech stack— requires changes across all five “trademarks” of agility: an organization-wide “North Star,” a network of empowered teams, rapid decision and learning cycles, a dynamic people model that ignites passion, and next-generation enabling technology.
- **People over process.** Even more importantly, agile represents a fundamental change in the culture and in expectations. Make sure that your employees’ journey of change is transformative, even life-altering -but not too disruptive. Remote work increases the need to double down on communication, to support human-to-human connections, and to offer practical support to people during the transition.

According to Goldman et al. (Goldman et al., 1994) agile companies are divided into four strategic levels: **customer satisfaction**, **secure acting** with uncertainties, be more competitive through **strong collaboration** and lever force of key employees **and information**.

All the above-mentioned factors are dramatically affected by three following components of corporate agility: **cultural impact** (human resources, processes, structure), **corporate governance** (structure, strategy, processes, human resources) and **organizational behaviour** (structure, processes, human resources, strategy). The **professional experience of management** component shall be reviewed in chapter three.

According to Version One’s annual State of Agile report (Version One, 2019) there are many benefits realized by companies adopting agile, and specifically worth noting is the increase in those reporting team morale improvements, along with increased reports of project predictability, and reduction in project risk.

These notions have a direct impact and shape all corporate processes and behaviour of employees, entities and stakeholders.



Figure 1.2. Components affecting corporate agility (developed by the author).

Cultural aspects influencing corporate agility.

One of components affecting corporate agility is culture. Culture could be understood as “the collective programming of the mind distinguishing the members of one group or category of people from others” (Hofstede, accessed 2022).

There are several authors (Schwartz, Gupta, House, Gelfand, Minkov, Trompenaars etc.) that conducted profound study of the cultural impact on both, human behaviour and the business practices. However, G. Hofstede is considered a founder with the highest authority in this field. For corporate agility’s purposes both corporate governance (Maassen, 2002; Yao, 2009) and organizational behaviour (Gelfand et. al., 2006; Griffin& Moorhead, 2014) should be analysed including the influence of the cultural factor as well. Thus, to explore the notion of corporate agility in depth the short introduction into the cultural aspects is needed. Hofstede’s Cultural Dimensions model is used as a basis for this discussion. It was found that there is a direct correlation between cultural aspects/ habits and economical success of a particular state. The differences in organizational behaviour and corporate governance affected by cultural factors shall be brought forward.

Hofstede (Hofstede, 2011) identified the following six cultural dimensions:

1. Power Distance. Power distance relates to the variety of solutions to the basic problem of human inequality;

2. Uncertainty Avoidance. Uncertainty avoidance is related to the level of stress in a society in the face of an unpredictable future. This is one of the most important factors in terms of agility and modern model of global business operations;

3. Individualism versus Collectivism. Individualism versus Collectivism relates to the integration of individuals into primary groups;

4. Masculinity versus Femininity. Masculinity versus Femininity is related to the division of emotional roles between women and men;

5. Long Term versus Short Term Orientation. Long term versus Short Term Operation, is concerned with the choice of focus of people's efforts: the future, the present or past;

6. Indulgence versus Restraint. *Indulgence versus Restraint* relates to the gratification versus control of basic human desires related to enjoying life, which has a direct correlation with Collectivism and Individualism level of a particular state.

The detailed overview of the above-mentioned dimensions and their impacts is available in Appendix 2.

The following charts allow to compare main cultural factors in different countries across the world and within the EU (Compare countries. Hofstede insights homepage, 2022). The first chart (see Figure 1.3) compares largest economies with different cultures: Continental European (Germany), Asian (Japan and China) and Anglo-Saxon (United States of America). Having focus of the research on European countries it is important to compare its characteristics with other global competing blocks. Here we can find that continental European dimensions are quite balanced and mainly have middle-level values. It allows to conclude that European model of governance should find cross-cultural cooperation less challenging. The way the European Union, led by Germany and France, acts on the geopolitical stage proves it further.

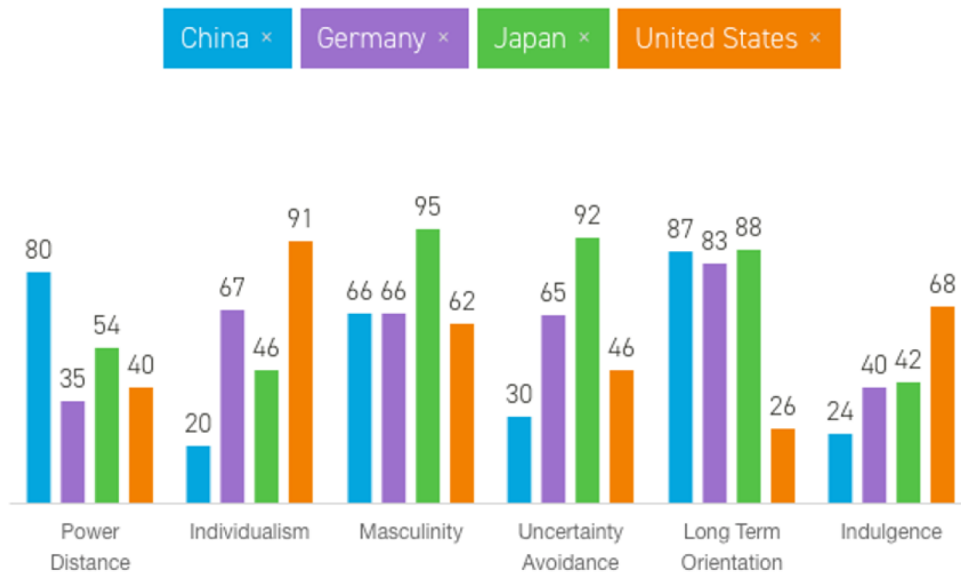


Figure 1.3 Cultural factors for China, Germany, Japan and United States. (Compare countries. Hofstede insights homepage, 2022)

However, the European Union is not a homogeneous state. It has 27 members, while most of the decisions ought to be achieved by a consensus. Such consensus is not always easily reached due to the some cultural, political, social and economic differences between member states. The chart (see in Figure 1.4) below provides information about four different cultures within the EU: Western Continental European (Germany), Scandinavian (Sweden), Anglo-Saxon (United Kingdom) and former communist block (Latvia).

Interestingly, cultural dimensions of Great Britain are very close to those of the United States of America. At the same time Latvia has the highest values for the power distance and restraint, which could be explained by influence of USSR governance, on the other hand it shows very high level of opportunities for women and their influence in the society, even higher than in Sweden.

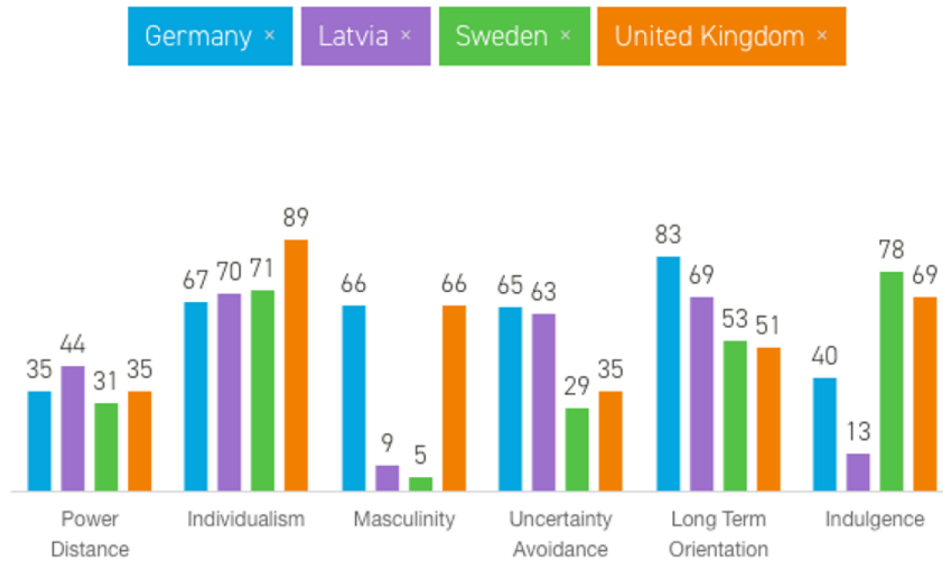


Figure 1.4 Cultural factors for Germany, Latvia, Sweden and United Kingdom.
(Compare countries. Hofstede insights homepage, 2022)

Cultural aspects play a significant role in business today. It affects each and every part of our daily routine, major decision-making at work and in personal life. It regulates the way in which the communication is held, what the motivation factors are for a particular person or a team, what business etiquette to be followed during meetings and operations. Culture shapes the human capital we work with. Thus, as will be described below, culture has a huge impact on both corporate governance and organizational behaviour, the two key elements for exploring corporate agility.

This research focuses on the European Union market. Thus, author will explore the research question through the prism of the European culture and behaviour patterns. Following the cultural impacts, the aspects of corporate governance and organizational behaviour that are affected and influence corporate agility should be reviewed.

Corporate governance in the concept of corporate agility.

The distrust between capital owners and those who manage and operate this capital became an issue when the first human hired his fellow to do some work. Disputes were often solved in a cruel way in Ancient and Medieval periods of human history, when small elite obtained both money and power doing almost whatever they want, even having a shadow of suspicion of improper treatment or misuse of the capital they entrusted in the hands of their subordinates. Later, at the end of the 18th century, Adam Smith (Smith, 1776 (2013)) discussed

totally different interests between owners and company managers, which negatively affected the efficiency of the company. The 90s of the 20th century introduced new challenges altogether with the new business environment. According to Cadbury (Cadbury, 1992) globalization, increase in a number of shareholders, development of the stock exchange, remoteness of investors and managers, permanent audit committees of the independent directors and the role of state enterprises and their impact on the society called for significant changes in corporate governance.

There are several theories that academics use as a basis for their discussion on corporate governance. According to Barbara L'huillier (L'huillier, 2014) the scholars who view the board and its activities from the perspective of personal characteristics and role of individual board members, write off “corporate governance” based on their perception of the character of human beings (human nature, human character). It is these theorists who denote the meaning of “corporate governance” from an agency or stewardship perspective. Those who view the board as a collective group or as individuals whose personal characteristics are not the primary point of focus, view “corporate governance” as a professional business arrangement, use the remaining three theoretical perspectives, managerial hegemony, resource dependency or stakeholder theory, as a foundation, without focusing on the individual human characteristics. Mamun et al. (Mamun et al., 2013) explore the mutual dependence of the corporate governance in Agency, Institutional, Stakeholders and Stewardship theories.

The Institutional theory claims that firms not only engage themselves in competition, but they also legitimise themselves. On the other hand, according to the Stewardship theory, stewards protect and maximise shareholders wealth through firms’ performance, maximising the stewards’ utility functions. Agency theory is based on the issues related to separation of ownership and controllability. Stakeholders (shareholders, employees, customers, lenders, suppliers, local charities, various interest groups and governments), if left to decide alone can open up severe loophole in principal wealth protection. **Figure 1.5** illustrates an over-lapping effect of the four theories and corporate governance.

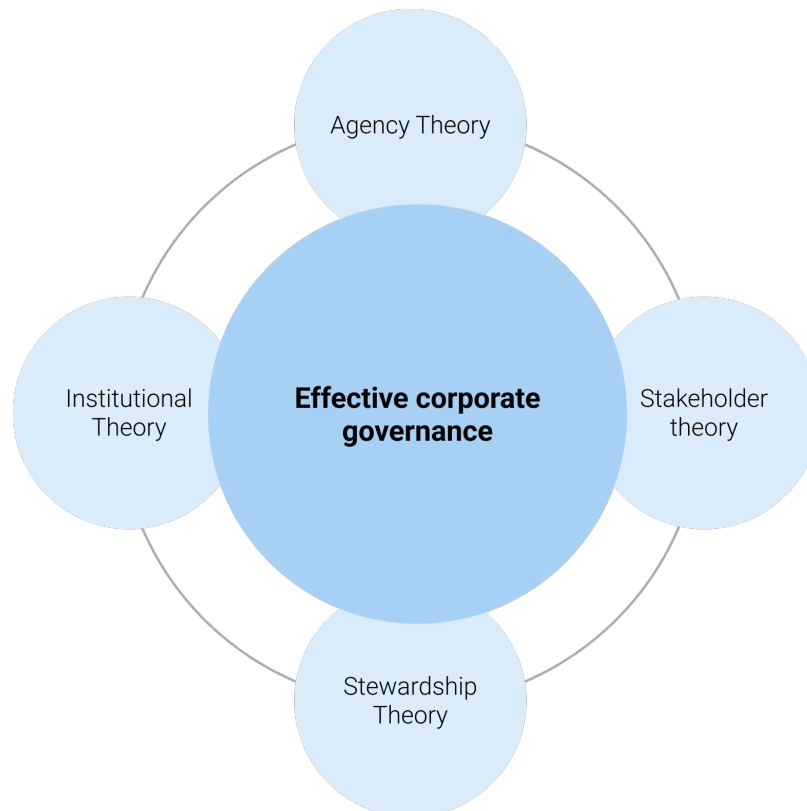


Figure 1.5 Overlapping effect of the four theories on corporate governance adapted from Mamun et al., 2013.

There are several definitions for term “corporate governance”, most widely used are the following:

Corporate governance involves a set of relationships between a company’s management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined. (*G20/OECD Principles of Corporate Governance*, 2015).

Corporate governance in its core code consists of four cornerstones, which are: openness, integrity, honesty and responsibility towards shareholders, employees, the environment and all stakeholders. (Jovanovic & Grujić, 2016).

In addition, a term “**Corporate Governance Code**”, sets the following basic principles:

- Leadership – there should be a clear division of competences and responsibilities between the supervisory and executive boards. Chairman is responsible for management board and for ensuring its success in all aspects;

- Effectiveness – the board and its committees should have appropriate range of characteristics, i.e. skills, experience, independence and knowledge about company that allow effective performance of their duties;
- Accountability – the board should present a fair, balanced and understandable assessment of company's status and prospects. Board is responsible for determining the nature and extent of the main risks, and it should find a reasonable way to manage them. Furthermore, the board should establish transparent principles of corporate reporting, risk management and internal controls;
- Remuneration – compensation of executive directors should be designed in such a way as to encourage the long-term success of the company. There should be a formal and transparent procedure for developing a policy on the compensation of executive management, as well as for fixed salaries of individual directors (no director should be involved in deciding on the amount of their own fees);
- Relations with shareholders – based on a common understanding of goals there should be a dialogue with shareholders and in charge for that is board as a whole. Board should use regular meetings to communicate with investors and to encourage their participation. (Corporate Governance Code, 2014)

Corporate governance is about creating and monitoring the mechanisms that are put in place by shareholders to control corporate insiders to maximize shareholder wealth by reducing agency loss. (L'huillier, 2014).

Corporate governance's solitary role is ensuring that corporate actions, assets and agents are directed at achieving the corporate objectives established by the corporation's shareholders. (Sternberg, 1998)

Corporate governance under the stewardship model means that in any given situation managers are good stewards of corporate assets and they work diligently to maximize shareholder returns. (Donaldson, 1990).

Corporate governance should focus not on motivation of the CEO but rather facilitative, empowering structures that will enhance effectiveness, resulting in superior returns to shareholders. (Donaldson & Davis, 1991).

Corporate governance should provide a vehicle for coordinating stakeholder interests. (Evan & Freeman, 1988).

Corporate governance, or the way in which the relations between owners and managers are organized in firms, is not a standard part of International Business (IB) research and teaching. If at all, it tends to be discussed as one of the idiosyncrasies of national business environments, and a function of different national regulations of companies and financial markets. (Morck, 2005).

Corporate governance deals with the relationships among the board of directors, management, shareholders and other stakeholders with respect to the control of corporations. (Yao, 2009).

Definitions are many, yet common elements may be traced. The author would suggest the following definition for the purpose of this work is proposed:

Corporate governance is the way in which the top management of the company is being controlled, supervised and limited by major and/or minor shareholders and major influential stakeholders.

For the clarification of the words and phrases included in the definition, the Merriam-Webster dictionary is used. (Merriam-Webster Dictionary, 2022):

Way – is a course (such as a series of actions or sequence of events) leading in a direction or toward an objective, manner or method of doing or happening, characteristic, regular, or habitual manner or mode of being, behaving, or happening;

The way in which – this is manner or method of doing or happening, characteristic, regular, or habitual manner or mode of being, behaving, or happening;

Top - the highest position (as in rank or achievement);

Management – the act or art of managing: the conducting or supervising of something (such as a business) or the collective body of those who manage or direct an enterprise;

Top management – persons within an organization with a highest position who manage or direct an organization;

A company – an association of persons for carrying on a commercial or industrial enterprise or those members of a partnership firm whose names do not appear in the firm name. Author's additional explanation: for a construction industry it is common to call enterprises, organizations and firms in united way – construction companies.

Top management of a company – persons within an organization with a highest position who manage or direct an organization, in this particular research – a construction company (Author's definition);

Control – power or authority to guide or manage or a device or mechanism used to regulate or guide the operation of a machine, apparatus, or system;

Being controlled – by application of power or authority to guide, manage or operate something (Author's explanation).

Supervised – to be in charge of;

Limited – restricted, characterized by enforceable limitations prescribed (as by a constitution) upon the scope or exercise of powers;

Major – greater in number, quantity, or extent;

Minor – inferior in importance, size, or degree : comparatively unimportant;

Shareholder – one that holds or owns a share in property;

Stakeholder – one who is involved in or affected by a course of action;

Major and minor shareholder – can be both private persons or legal entities that either directly (e.g. being in supervisory board), or indirectly via approving management and supervisory boards members influence the company management and protect their interests.

The main aspect or added value of this definition is “stakeholders”. In today’s global and dynamic environment, especially when social networks and media have strong impact on a company and a brand, the stakeholders are undeservedly forgotten, at the same time they also have significant impact and influence. Furthermore, stakeholders are those who affect corporate agility directly.

The definition of the term “corporate governance” was discussed and approved during the interviews with construction industry experts (see appendix 1, in accordance with the General Data Protection rules information about the participants is codified).

As evident from the theoretical frameworks and abovementioned definitions most literature depicts corporate governance as a set of certain tools and processes that primarily regulate the relationship between managerial and supervisory boards, top management and shareholders having a limited impact on other fields the enterprise may influence over. Only recent research, under the stakeholders’ theory umbrella, develops an idea that corporate governance puts in place structures where stakeholders can state their case, reduce the effects of information asymmetry and have an enforcement component built in to protect the rights of stakeholders (L'huillier, 2014).

Notwithstanding the globalization impact, another important aspect that should not be overlooked is how particular cultures affect corporate governance. There are several “models” of the corporate governance used by the companies from the largest economies.

Although the focus of this work is on companies based in the Baltic States as integral part of the EU market, general overview of major perceptions used worldwide should be provided. There are several schools and interpretations of the term, meaning and practical application of the definition “corporate governance”. Within the research the author has found **Anglo-Saxon or Anglo-American model, European or Continental model and Japanese model** as most fitting to discuss within the dissertation.

Combining these two important components, cultural and formal, the different approaches to corporate governance are summarized and compared in Table 1.1.

Table 1.1

Comparison between different approaches for corporate governance (adapted from Ungureanu, 2012, Yao, 2009, and Maassen, 2002).

Aspects	Model of corporate governance		
	Anglo-Saxon	Continental Europe	Japanese
1	2	3	4
Control	Dispersed and external	Concentrated and internal	Concentrated (cross – ownership) and internal
	Separation of ownership from control	The association of ownership with control	The association of ownership with control
Considers	Shareholders property rights	Shareholders property rights and relationship with employees (unions)	Multiple stakeholders interests (keiretsu)
Management	Board of executive and non-executive directors	Supervisor board Board of directors	Board of executive directors (non-executive director is exception)
Oriented towards	Stock market	Banks	Banks and Government
Hostile takeovers	Happen	Do not happen	Do not happen
Interests of other stakeholders	Are not represented	Are represented	Are represented
Commitment of outside investors	Low	High (rare intervention)	High (rare intervention)
Evaluation	Financial performance	Return on social capital	Return on human capital
Transparency	High	Medium	Medium - low
Reaction time	High	Slow	Slow
Resistance to change	Low	Medium	High

Anglo-Saxon or Anglo-American model - countries such as the US, the UK and Canada have adopted variants of the one-level board model. In this model, executive directors and

non-executive directors operate together in one organizational layer, the so-called one-tier board. Some one-tier boards are dominated by executive directors, while others are composed of a non-executive director majority. In addition, one-tier boards can have a board leadership structure that separates the CEO and chair positions of the board. One-tier boards can also operate with a board leadership structure that combines the roles of the CEO and the chairman. This is called CEO-duality. One-tier boards also often make use of such board committees as audit, remuneration and nomination committees (Maassen, 2002). The shareholders may only nominate board members formally having no influence on the directors and daily operations. On the other hand, they may manipulate the operational decisions by stopping or granting additional funding for the entity, lobbying own development direction of the company. According to Ungureanu (Ungureanu, 2012), financial support of shareholders is the most important weapon they have over managers.

The pressure to improve independence of one-tier boards is continuously implemented by variety of the stakeholders: financial institutions, regulators, stock exchanges, investors, etc. Particularly, one-tier boards with a majority of executive directors are under pressure to increase the number of independent non-executive directors.

Another criticism is linked to the practice of directors to combine the influential position of the CEO with the leadership of the board in one-tier boards (Boyd, 1990). According to Sheridan and Kendall (Sheridan & Kendall, 1992), "there is an uncomfortable untidiness in having one group of directors supervising or controlling another group on the same board, which is meant to be the collective for managing the company". The explicit conflict of interest, in the companies where one-tier board is chaired by the CEO, who may be the shareholder as well, often leads to the poor performance and challenges from the stakeholders, that require a qualitative change by increasing the number of independent non-executive directors. Fortunately, the bigger the company becomes, the less influence any particular person has. The mechanism of separation of the decision-making process from the decision control process is highly actual in the one-tier board entities. Maassen (Maassen, 2002) argues that new listing requirements and voluntary guidelines promote independent audit, remuneration and nomination committees composed partly or entirely of non-executive directors should establish a system of checks and balances in the boardroom.

European or Continental model – Most of the Continental Europe countries, including such big economies as Netherlands, France and Germany, or smaller ones, such as Finland,

Latvia, and Estonia, have adopted variants of the two - level board model. There is a clear split between operational (executive) and supervising functions. The supervisory board (the upper stratum) is entirely composed of non-executive supervisory directors who may represent employees, the government and/or institutional investors. The management board (the lower stratum) is usually composed of executive managing directors. The corporate laws do not allow one person to maintain positions in both management and supervisory boards. By so doing, both boards are independent from one another that in turn allows for better transparency on the one hand, and higher formality and bureaucracy on the other. (Adapted from Maassen, 2002). The European model has following advantages:

- Transparent definition of responsibilities of the management and supervisors (Sheridan & Kendall, 1992);
- The supervisory board (the upper layer) is completely staffed with non-executive supervisory directors, while the management board consists solely of executive management directors. Such arrangement secures an independent operation (Pic, 1997);
- Two-level boards also provide a formal separation of CEO and chairman roles. As such, decision management and decision control are formally separated in this board model (Demb & Neubauer, 1992);
- Supervisory board often includes founding family members, financial institutions, retired managers, etc. (Larcker, retrieved at 2020).

At same time, several studies (Maassen,2002; Ungureanu, 2012; Sheridan & Kendall, 1992; Veldman et al., 2016) demonstrate that European model is characterized by high concentration of capital/ownership, shareholders have common goals with the company, significant influence and control are executed by related parties (banks, partners, unions, owners, employees etc.).

European and American codes of corporate governance have begun the process of integrating with each other Payne (Payne, 2006). Given the influence of both the German model of privileged information and the British model of transparency and accountability, the balance is tilting ever more towards the latter in central and Eastern Europe. Even Germany has initiated a process of transformation in this direction (Yeoh, 2007).

The third widespread model that represents one of the strongest economies in the world is **Japanese model**. Losses in the Second World War and expansion of American

companies provided an initial basis for the corporate system in Japan. Many formal procedures were borrowed from US corporate environment. Despite that, there are many divergences in the way the Japanese corporations are governed. According to many researchers (Yao, 2009; Ungureanu, 2012; Larcker, 2020 and others), Japanese model has a very high level of cross ownership of affiliated companies and long-term relationship with banks and stakeholders. The state formal and informal behaviour, industrial policies and historical – cultural background were developed and continue to maintain “keiretsu”. This unique network of loyal suppliers and partners that many times are linked by long-term business relationship and/or cross-shareholdings of debt and/or equity. Due to the cultural peculiarities and reasons mentioned above there is a very low influence of the independent shareholders, and most companies staff their boards of directors with executive representatives from inside or from “keiretsu”, whilst most non-executive directors are part of non-influencing minority or are not present at all. The state plays an important role in Japanese business environment. Officials may have formal or informal representation in the company in case it faces financial problems. This state policy together with the significant influence of the main financing bank allow to fully control the board of directors and replace it in case of improper performance.

It is a very common and encouraged approach for the employee to remain very loyal to the corporation and its management. In Japan, the employment system is founded on two main elements: first, lifetime employment, in which workers spend their entire career at the same firm, slowly working their way up the ranks; second, seniority-based pay (age-based pay), which links wages to length of tenure rather than ability. (Yao, 2009).

As we may see even the names of the models were given to highlight not only geographical but also cultural component that affect business environment and corporate governance of a particular company. There are other models such as Korean or Chinese, or Russian but these can be considered as sub-models having peculiarities but being originated or heavily influenced by one of the three main models discussed above. Nevertheless, summarizing corporate governance models we should bear in mind that formal form determined by law is as important as cultural - historical behaviour. For instance, collectivist cultures, such as those of China, Korea, and Japan, cherish family as a cultural value and work-group goals, while Anglo-Saxon countries promote individuals (Chiper, 2010).

According to Yao (Yao, 2009) in the U.S. the critical problem of the modern corporate governance is the principal-agent problem arising from the separation of ownership and control in that sometimes the managers may ignore the profits of the numerous and dispersed shareholders and breach their fiduciary duties. As a result, the owners of the company may lose money that they have invested at the hands of dishonest or reckless managers. In order to control this agency problem, the strong stock market and the takeover mechanism are used as instruments for aligning the benefits of shareholders with managerial interests. Conversely, Japan has developed an alternative governance mechanism. Since the ownership is concentrated in the hands of a keiretsu partner or the main bank, who plays a more important role in monitoring the management, most companies in Japan are shielded from takeovers and both ownership and the control of the management are fused in practice.

The modern companies are exposed to a vast number of risks, which must be evaluated and properly managed to keep company both safe and profitable. Effective risk management is based on a foundation of good corporate governance and rigorous internal controls (McDonough, 2002). On the other hand, Jovanovic & Grujić (Jovanovic & Grujić, 2016) found what further complicates corporate governance worldwide is a changing business environment. All abovementioned proves the importance of agility in all corporate aspects, including governance.

It is evident corporate governance has a huge impact on corporate agility and vice versa. The cultural aspects and the way how the management is being controlled and supervised leave a significant impact on the company's structure, its internal processes and external communication. However, there is one more discipline that affects company's operating and reorganizing capacities even more than corporate governance - it is organizational behaviour.

Organizational behaviour in the concept of corporate agility.

Although it is formally a new discipline of modern science, but in fact organizational behaviour's elements are among the most ancient factors that were used, treated, developed and assisted in survival of the entire Homo Sapiens race.

The studies of human behaviour as with almost any other social or psychological research are simultaneously extremely interesting and very challenging. The reason for this is that there are no absolute concrete rules or previously proved formulas of what to expect from the research object or how to construe the results. Another challenge that behaviourists

face is the generalization and implementation of the elaborated models or theories. The behaviour of each individual is very subjective and is being influenced by so many non-coherent or, according to Kondalkar (Kondalkar, 2007), “situational” factors that are hard to predict. Despite all this, at the end of day these concrete actions of individuals are those that shape the behaviour of teams, groups, companies and states.

Social life is, to a large extent, determined by organizations. Companies, banks, schools, hospitals, sport clubs and universities are all types of organizations (Jacobs, 2018). The environment of all organizations is changing at an unprecedented rate. Even industries characterized by what have been staid and predictable environments, such as traditional retail and heavy manufacturing, face sweeping environmental changes today. Understanding and addressing the environment of a business has traditionally been the purview of top managers. But the effects of today’s changing environment permeate the entire organization. Hence, to truly understand the behaviour of people in organizational settings, it is also necessary to understand the changing environment of business (Griffin and Moorhead, 2014). Thus, it is crucial to know and understand how individuals affect organizations and vice versa.

There are several definitions of organizational behaviour, nonetheless the following could characterize the core of this discipline:

- **Organizational behaviour** is a field of study that endeavours to understand, explain, predict, and change human behaviour as it occurs in the organizational context (Wagner & Hollenbeck, 2010);
- **Organizational behaviour** is a field of study that investigates the impact that individuals, groups and organizational structure have on behaviour within the organization, for the purpose of applying such knowledge towards improving an organizational effectiveness (Kondalkar, 2007);
- **Organizational behaviour** is the study of human behaviour in organizational settings, the interface between human behaviour and the organization, and the organization itself (Griffin & Moorhead, 2014);
- **Organizational behaviour** is a field of study that investigates the impact that individuals, groups and structures have on behaviour within organizations (Robbins & Judge, 2015);
- **Organizational behaviour** focuses on the world of organizations. The concern is, first, with the behaviour and nature of people within organizations, and, second,

with the behaviour and nature of organizations within their environments (Minner 2006);

- **Organizational behaviour** is the study of individual and group behaviour in organizational settings. OB looks at organizations as entities, the forces that shape them, and their impact on its members (Dolan & Lingham, 2008);
- **Organizational behaviour** can be defined as ‘the study of the structure, functioning and performance of organizations and the behaviour of groups and individuals within them (Pugh, 1971);
- **Organizational behaviour** studies the behaviour, attitudes and performance of people in organizations. This field puts the focus of analysis on how employees’ work contributes to or detracts from the effectiveness and productivity of the organization (Dailey, 2016);
- **Organizational behaviour** is defined as the systematic study and application of knowledge about how individuals and groups act within the organizations where they work (Bauer & Erdogan, 2010).

Although there are many definitions, a common thread may be traced through most of them. Therefore, for the purposes of this study the Author proposes the following definition:

Organizational behaviour is actions of individuals and teams within the organization and their influence on the organizational effectiveness and performance.

For the explanation of the words and phrases included in the definition to Merriam-Webster dictionary (Merriam-Webster Dictionary online, 2022) is used:

An action – behaviour, conduct;

An individual - a single human being as contrasted with a social group or institution;

A team - a number of persons associated together in work or activity;

An organization - an administrative and functional structure (such as a business or a political party; personnel of such a structure;

An influence - the power or capacity of causing an effect in indirect or intangible ways;

Organizational - of or relating to an organization;

Effective - producing a decided, decisive, or desired effect;

An effectiveness - the power to produce a desired result;

A performance – the execution of an action, the ability to perform;

Organizational effectiveness – the maximization or achievement of any measurable goal (profit, turnover, number of people helped, etc) the organization is aiming to, within usage of minimal resources;

Organizational performance – the most effective way the company implements its primary and support activities, to achieve corporate goals.

The main aspect or added value of this definition is an alignment or connection of individual actions with the effectiveness and performance of the organization.

The definition of the term “organizational behaviour” was discussed and approved during the interviews with construction industry experts (see Appendix 1, in accordance with the General Data Protection rules information about the participants is codified).

Three levels of organizational behaviour:

Broadly speaking, organizational behaviour covers three major levels of analysis: ***micro***, ***meso*** and ***macro***. Consequently, according to Wagner & Hollenbeck (Wagner & Hollenbeck, 2010) each level focuses on a different aspect of organizational behaviour as following:

- **Micro organizational behaviour** is concerned primarily with the attributes and performance of individuals in organizations.
- **Meso organizational behaviour** focuses on the characteristics of groups and the behaviours of people in teams.
- **Macro organizational behaviour** addresses the “behaviours” of organizations as entities.

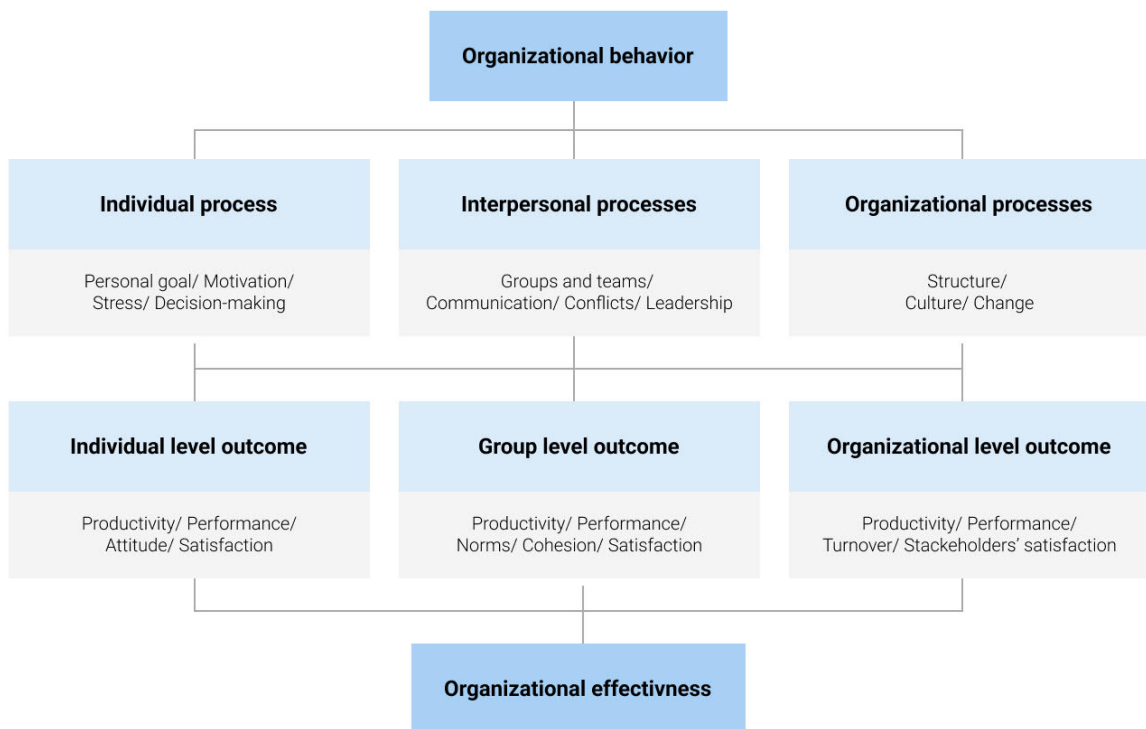


Figure 1.6 Levels of organizational behaviour adapted from Griffin & Moorhead, 2014.

Important element of organizational behaviour in the modern world is a cross-cultural factor. It deals with cross-cultural similarities and differences in processes and behaviour at work and the dynamics of cross-cultural interfaces in multi-cultural domestic and international contexts. It encompasses how culture is related to micro-organizational phenomena, meso organizational phenomena, macro organizational phenomena, and the interrelationships among these levels. (Gelfand et al., 2006). A vast number of research (Earley et al., 1999; Yamaguchi, 2005; King & Bu, 2005; Brown & Reich, 1997; Kurman, 2001; Vecernik 2003; Hofstede, 2011; Eylon & Au, 1999; Gelfand et al. 2001; Gelfand & Dyer 2000; Gelfand et al., 2006; Yao, 2009 etc.) focuses the peculiarities of business and managerial approaches in different cultures. The perception and treatment of the notions such as employee motivation, behaviour, setting and achieving personal and corporate goals, reward programs, conflict management and resolution, corporate effectiveness and performance, level of work satisfaction, negotiation strategy will greatly differ depending on the individual's cultural background (setting).

In general, high cultural diversity within the team is one of the major factors for their lower performance compared to the homogeneous teams. However, over time multicultural teams are able to act as homogeneous ones. (Gelfand et al, 2006).

The modern corporate and business world is very dynamic. The volume and velocity of data, and information that flow to and through the modern employee exceed ten if not hundred times what people were used to before the era of internet and smart phones. It is important to note that this era started about 25 years ago. Only a quarter of a century ago it was inconceivable that each and every kid would have a couple of emails and sometimes more than one mobile phone.

Borders are disappearing. All large and midsize companies become multinational. The list of shops in the mall in Warsaw, Riga, Copenhagen, or Madrid will not differ dramatically, McDonalds, Zara, Ecco, Lego and Nike will be there.

European market provides a great deal of opportunities for the construction companies. Large infrastructure projects, cohesion funds, increase of population demand well-educated and motivated professionals. Professionals that are ready to face challenges, to work in multinational teams, to react quickly to the new problems, or even forecast and act proactively to prevent them before they arise. Yet these professionals are not working individually. It is not possible in almost any construction project. The organizations play a huge role and shape the building industry. Their resources, culture, rules, internal processes, structure, and organizational behaviour is what shapes post-graduates and turns them into professionals the market is seeking.

Organizations shape people, but people no less influence organizations. It is almost impossible neither for individuals nor for the company to survive if either, or both, are not able to forecast the upcoming changes, determine the means needed to adapt to the circumstances, and successfully continue to develop. In other words, *they have to be agile*.

Considering that construction industry is author's field of interest, it is essential to investigate whether there is a demand within the construction industry for corporate agility.

1.4. Determination of the demand for corporate agility within the construction industry

Following the analysis of academic literature, research, interviews, and questionnaires author decided to further determine whether there is a demand for corporate agility within the construction industry.

As Cooper & Burrell, (Cooper & Burrell, 1988) said ‘the world is not already there, waiting for us to reflect it’. There are many factors that affect or are affected by corporate agility. **To prove the abovementioned findings, author decided to distribute the questionnaire among construction industry professionals to verify whether his conclusions are correct.**

According to Aghina et al. (Aghina et al., 2020) companies face implementation choices across five operating-model dimensions, when want to increase level of enterprise agility.



Figure 1.7. “5 operating-model dimensions” adapted from Aghina et al. 2020.

These dimensions were discussed in detail in the previous chapter. The author proposes to adopt the five operating-model dimensions to the research as a logical and easy understandable approach to the classification of agility dimensions. However, to provide the clarity for the respondent’s, short explanation for each of them is offered below.

Corporate agility is a company’s ability to identify and effectively react to internal and external opportunities and/or challenges and/or unpredicted changes within the shortest possible time frame, while the minimal resources (financial, HR, and etc.) are being used for such transformative activities.

Aghina et al. (Aghina et al., 2020) claims that agile organizations can quickly redirect their people and priorities toward value-creating opportunities. A common misconception is that stability and scale must be sacrificed for speed and flexibility. Truly agile organizations combine both: a strong backbone or centre provides the stability for developing and scaling dynamic capabilities.

Strategy is a road map to the defined corporate goals through continuous improvements and development of the competitive advantages. Wright et al. (Wright et al., 1992) said that it is a top management’s plans to attain outcomes consistent with the organization’s missions and goals. Mintzberg et al. (Mintzberg et al., 2006) views the strategy as a perspective, a plan on the one hand, and as a pattern in terms of past experience and actual implementation of the previously stated strategy, on the other

Strategy as a dimension here means future, development, guidelines for the next steps to take, values to follow the path and vision of what a company and its staff want to become. Strategy should take a company to the place where it had never been, to turn it to the enterprise that its founders only dreamed to be. However, this should be embodied across the whole company, all its divisions, departments, and teams. The values, vision and corporate goals should engage each employee. It is also important for personal values, personal goals to be aligned with the corporate ones, and employee should believe accept this corporate ideology.

Structure - is the way in which the organization is designed. McAuley et al. (McAuley et al. , 2007) found that managers and their organizations make choices, and in doing so, tend to act rationally. They are aware of contingencies, and they develop structures to meet those contingencies. The main question to be asked whether this design provides a proper answer to the company's needs and plans. Parsons (Parsons, 1951) suggest that every human system – from the individual to the family to the organization to the society itself – needs four key components (Adaptation, Latency, Integration and Goals) for it to survive.

The relationship among different hierarchical stratum, different teams, division of responsibility, subordination, control, and reporting are derived from structural design of an organisation. Structure affects communication and daily operation. The ungrounded ignorance of organizational structure leads to mess, losses, and demotivation of its staff. Aghina et al. (Aghina et al., 2020) found that autonomy, mastery and purpose in structural change deliver amazing results. Stripping a multi-layered hierarchy down to a few layers will make company flat and agile. This means that a core team of leaders needs to be established, , unnecessary bureaucratic burdens eliminated, small autonomous cross-functional teams empowered with full end-to-end responsibility for the specific projects or missions. Expertise knowledge sharing across a broad range of functions assists in solving problems quickly, but what is more important it allows to prevent many of them. The objective is to inspire a cross-team cooperation and aim for achieving clear corporate and common goals.

Process – as previously defined, corporate agility is about quick transformation, so the processes should be flexible, transparent, easy to follow, and adjustable. Weber (Weber, 1948) and Adizes (Adizes, 2014) explore in depth the issue of bureaucracy, reaction capability of a company and its operational patterns. Meyer & Marion (Meyer & Marion, 2016) describe processing elements as those that guide organizational agility (further discussed in chapter

three below). Almost no rigid rules and preconditions should be in place. Fluidity, rapid learning, involvement of stakeholders and subcontractors, cross-department cooperation, quick decision making, and knowledge sharing in self-governed teams are key elements for the creation of agile processes environment. Jadoul et al. (Jadoul et al., 2020) suggest putting people above processes in agile enterprises. With respect to this research, it should be taken into account when results of the research are analysed and interpreted.

People – As was previously discussed, the human capital is one of the most valuable assets of the company. The dynamics of the staff, their motivation, passion to work, communication, cooperation and knowledge makes the difference between the successful and average or even decaying organization. However, Maslow (Maslow, 1943) in his Theory of Human Motivation, and later Vroom (Vroom, 1964) in Expectancy Theory, analysed the reasoning of the human motivation, and alignment between corporate and personal aims. McKinsey & Pink (McKinsey & Pink, 2009) identified several factors that could explain the impact of agility on employee engagement. Most fundamentally, in a non-hierarchical organization of cross-functional teams, employees can develop a strong sense of autonomy, mastery, and purpose. According to the opinion of the author, it gives a solid framework for agility implementation in companies, including construction industry.

Proper communication and motivation of the employees, as was discussed in previous chapter, will lead to the greater engagement and self-identification of the personnel with the organization.

Technology – technology is a driving force of productivity, which is described as a one of PESTEL influencing factors. Technology development has dual impact on the construction company. It primarily has an external impact being created and deployed from outside. According to Kondalkar (Kondalkar, 2007) Contingency theory assumes that organization's internal functions should be consistent with the technology. According to Harvey and Ashworth (Harvey and Ashworth, 1993) the construction industry has always been characterized as low technology and low productivity. Since there is a limitation and new product development in the construction industry, is out of scope of this work, as Porter and Millar (Porter & Millar, 1985), Pérez-Bustamante (Pérez-Bustamante, 1999) and others discussed, technology turns into information and knowledge sharing, the deployment of new products and approaches. Obtaining good education and promoting cooperation with universities should improve the situation of resistance to new approaches, and provide more

educated and laterally thinking professionals to the industry, that use the latest technological tools to do their job qualitatively, on time and safely for both people and the environment.

The field research.

On the basis of systematic literature review, interviews and researches mentioned above, a questionnaire was designed by Author to assist in detecting the level of importance corporate agility in the construction company (see table 1.2 for the list of questions and academic source references, and Appendix 3 for the full version of the questionnaire). In accordance with the General Data Protection rules participant personal information is codified. Respondents were asked to fill his/her answers by numerically expressing his/her agreement or disagreement with the description. The questionnaire had be filled by as many employees as possible from all levels and departments. Each answer has its score number.

The target audience of this research is about 70 000 employees working in Latvian construction industry. The questionnaire was developed in electronic form (google docs platform), distributed by e-mail and via social networks. During the January – February, 2021, the link was distributed among employees of public, state- and privately-owned construction companies. Total number of recipients was 3021 addressees. 508 responses were received. The response rate is about 17%, which is optimal according to recommendations of several sample size calculators as the minimal number of respondents according to the calculation with 5% margin of errors should be above 385 (<https://help.surveymonkey.com/en/solutions/calculating-respondents/>).

The following socio-demographical data was provided by the respondents: age; gender; position; department; number of years in the construction industry and education.

Table 1.2

The questionnaire on importance of corporate agility for the construction company developed by Author.

#	Operating – model dimensions of the agile construction company	Source of reference ¹
1	2	3
	Strategy	
1	How important are corporate values, corporate goals and clear strategy for the company and its employees?	Duckworth (2016); Mintzberg et al (2006), Fehlau and Stock, C. (2012); Soares (2012); Porter (1996), Whittington (2001), Rumelt (2011), Vroom (1964)

¹ For the authors and publications details please see bibliography list

Table 1.2 Continued

1	2	3
2	How important is the alignment of the employee's personal goals with corporate goals of the company?	Maslow (1943), Vroom (1964), Porter (1996), Whittington (2001), Rumelt (2011), Vroom (1964); Mintzberg et al. (2006)
Structure		
3	Please evaluate, which organizational structure suits better the flat and flexible, or hierarchical and rigid?	Burnes (2017), Adizes (1999), McGinn (2017), Mintzberg et al. (2006), Parsons (1951), Maassen (2002), Nunnally (2007)
4	How important is a cross-department cooperation in the company?	De Weerd et al. (2020), Brockmann and Girmscheid (2010), Parsons (1951), Stevens (2007)
Process		
5	Please provide your opinion whether a quick and rapid decision making process in the company is important?	Burnes (2017), Adizes 2014, Meyer & Marion (2016); Weber 1948; McAuley, et al (2007).Nunnally 2007
6	Do you think that high level of bureaucracy (instructions, approvals, limits, paperwork and etc.) slows down the development of the company and harm its operations?	Weber (1948), Adizes (2014), Burnes (2017), McAuley et al. (2007)
People		
7	How important is a support in implementation of employee's initiatives and ideas by the company?	Kondalkar(2007), Hofstede (2011), Maslow (1948), Vroom (1964), Maassen (2002)
8	Do you think that work in non-hierarchical (flat) organization with good cooperation of cross-functional teams, will motivate people to develop passion to work and to become more engaged?	McAuley et al. (2007), De Weerd et al. (2020), Brockmann and Girmscheid (2010), Maslow (1948)
Technology		
9	How important is a usage of modern software (planning, design, quality control and etc) in the construction industry?	Koeleman et al. (2019), Stevens (2007), Kähkönen & Sexton (2005), Kast and Rosenweing (1979), Motzko et al. (2013)
10	Should universities and construction industry develop much deeper cooperation?	Duckworth (2016), Maslow (1943), Vroom (1964), Adizes (1999), Motzko et al. (2013), Mangialardo& Micelli (2018)

To perform analysis of the questionnaire results **Alteryx, an Analytic Process Automation platform** was used. The choice was made in favour of Alteryx, as it is a self-service data analytics platform that is quick to implement. It also requires no special data science background to perform a data set analysis. Access to data sources, and then blending, cleansing, exploration and preparation for modelling is available through an easy-to-use graphical interface.

Alteryx allows to visualize data pipelines. These data pipelines are called Workflows (see fig. 1.9). A workflow consists of connected tools that perform different functions to

process data. When a workflow is built, tools are added, connected, and configured. Tools are divided into categories, based on the type of functions they perform. Every group has its own colour and shape which makes it easier to understand any workflow, greens are for data input and output, blues are for preparation and calculations, oranges are for transformation and yellows are for reporting.

The raw data was collected and saved in Excel (xlsx) format. This data was accessed via an Input Data tool. Input Data tool allows to bring data into a workflow from different data sources (files, data bases, transactional systems, etc.). Blue tools from the Preparation tool did just that.

First, a *Select tool* helped to remove unnecessary columns and rename the remaining columns. Then a *Data Cleansing tool* fixed several issues with the data, such as leading and trailing whitespaces and capitalization. Then the data journey was separated in a few streams.

The upper stream created an Interactive Chart with Whisker plots (fig 1.8). Whisker plots show a quick, five number summary in a chart. The main part of the chart (the “box”) shows where the middle portion of the data is: the interquartile range. At the ends of the box, one may find the first quartile (the 25% mark) and the third quartile (the 75% mark). The far left of the chart (at the end of the left “whisker”) is the minimum (the smallest number in the set) and the far right is the maximum (the largest number in the set). Finally, the median is represented by a vertical bar in the centre of the box.

The next step is transformative, using a *Transpose tool*. These tools allow to pivot the orientation of data in a table by moving horizontal data onto a vertical axis. Then calculations of Average and Median by different groups were performed with assistance of *Summarise tools*. The calculated results were sorted and presented in two ways: graphical charts and Excel spreadsheets.

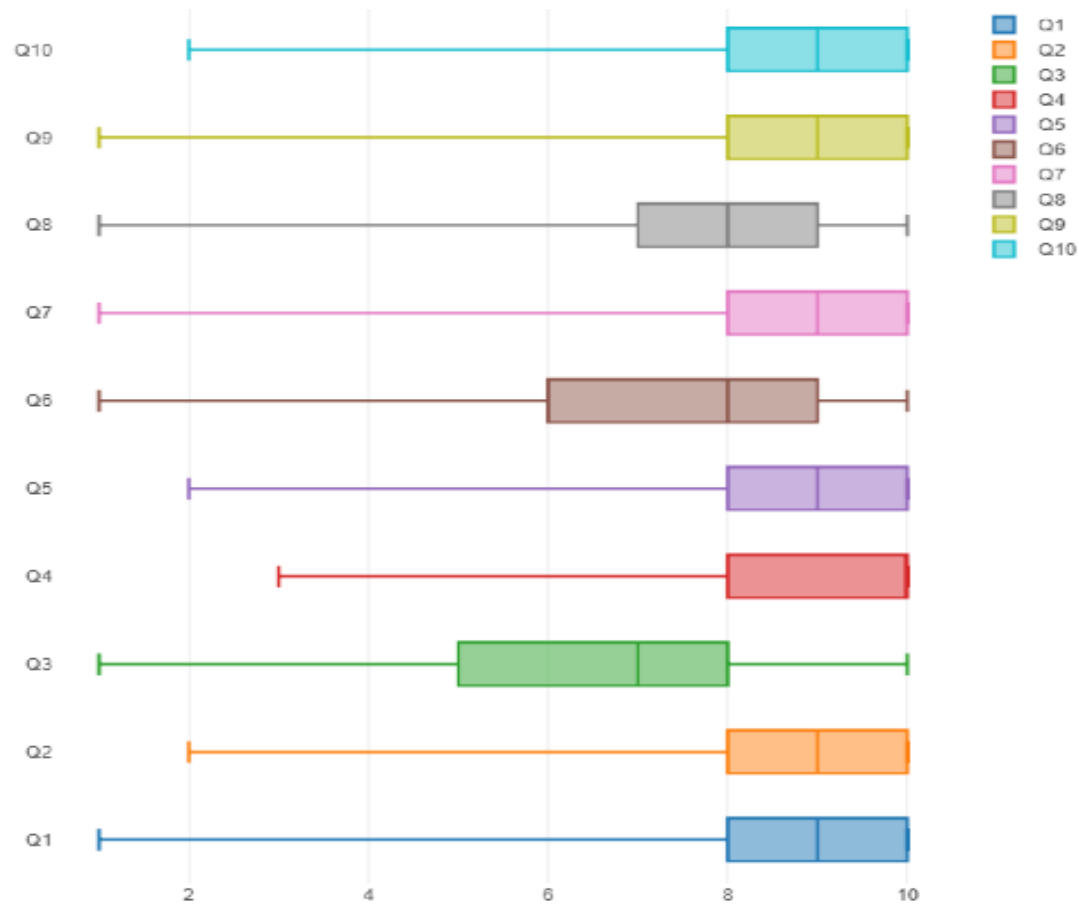


Figure 1.8. Whisker plots of scoring given by the respondents for each question (developed by author using Alteryx program).

There were 508 respondents completing the questionnaire. The fig. 1.10 shows average and median data for all answers. The answers sorted by gender, age and education are presented in Appendix 4. The questionnaire was sent only to entities and professionals from the construction industry. The respondents came from both state and private sectors. However, most probably there is a room for further research, since only 302 males and 350 engineers answered the questionnaire. Both numbers deviate from the overall statistics that show the total male prevailing in the industry (please see chapters two and three). The most feasible explanation may origin in that the questionnaire was filled mainly by office staff, and to a lesser extent by staff from the construction sites. Historically office personnel include more females in the positions such as secretary, bookkeeping, marketing, lawyers, respectively having less engineers at the office level. Nevertheless, the questionnaire was filled by the industry's representatives, amid whom about 60% are male, and more than 70% obtained an engineering diploma. The workflow that was built for the purpose of this work is shown in the fig 1.9.

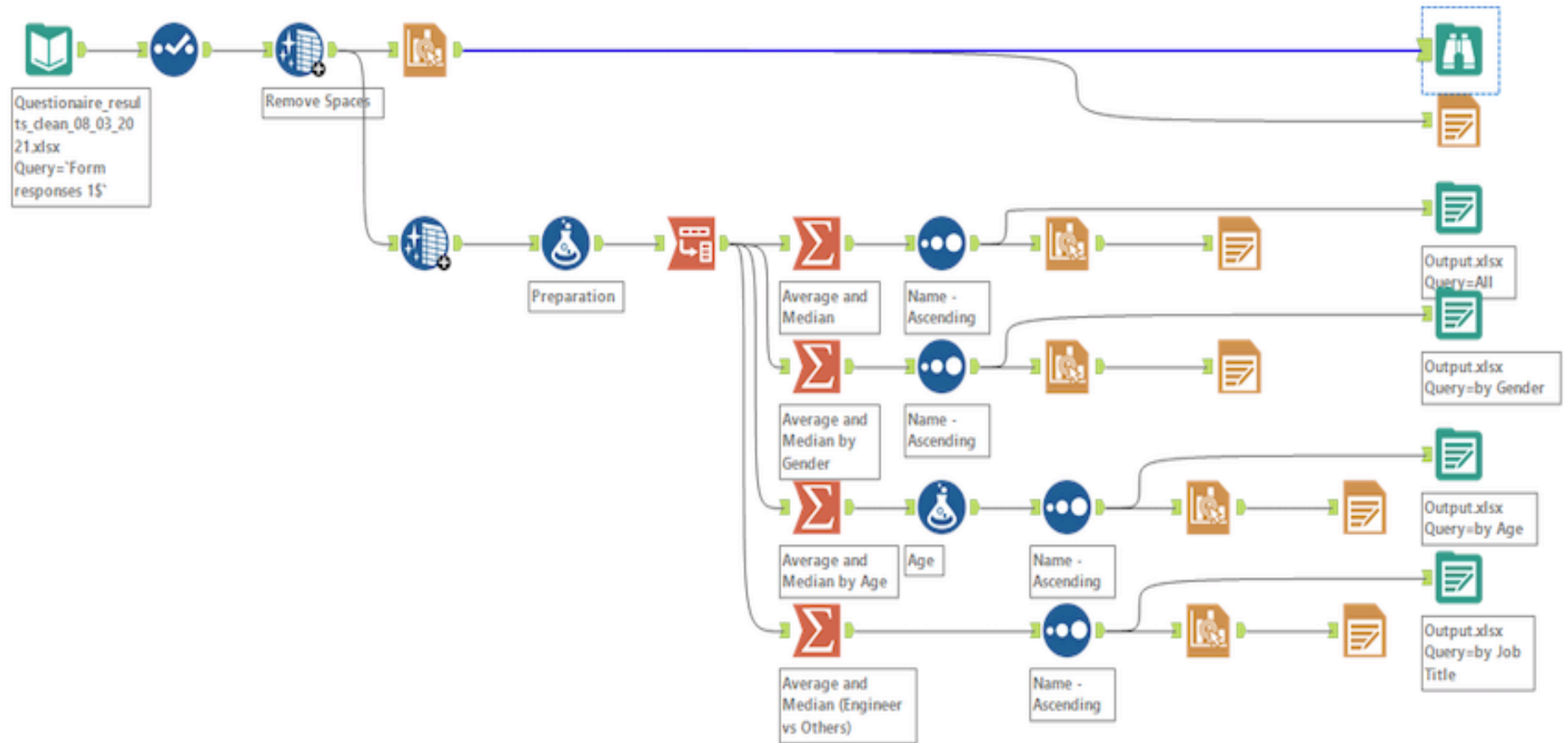


Figure 1.9 The workflow analysing questionnaire results sourced from Alteryx program (developed by author).

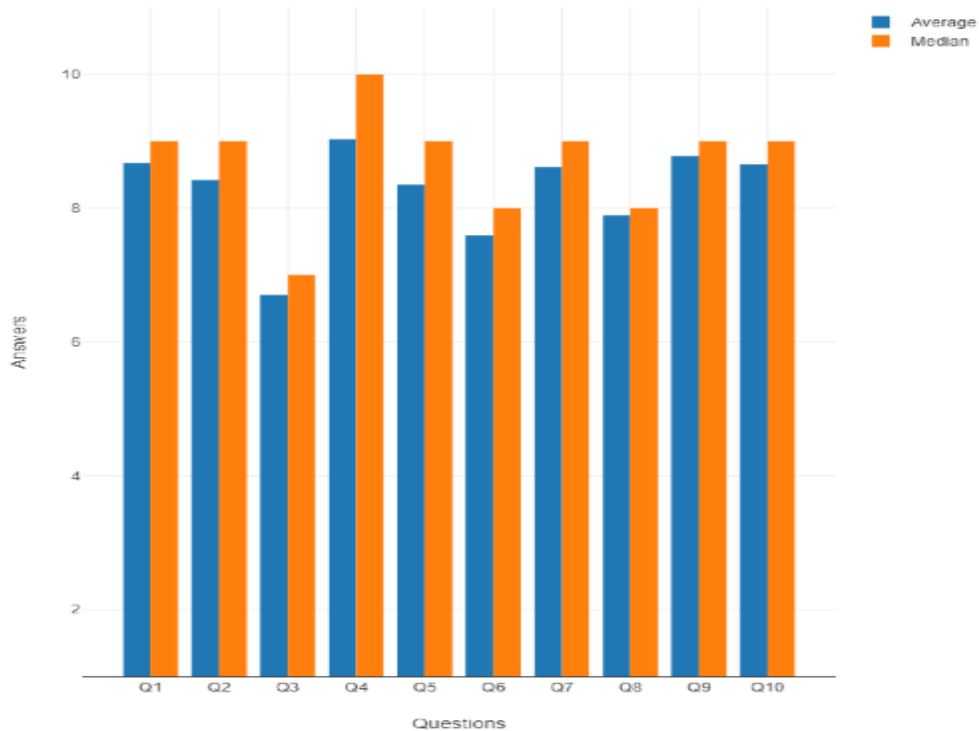


Figure 1.10 Average and median data of scoring given by the respondents for each question (developed by author using Alteryx program).

The questions were structured as follows: the higher the score was given as an answer the more the respondent strives towards corporate agility. It is clear from the results presented in figures 1.8 and 1.10 that importance of the corporate agility in the construction industry is highly supported. There are slight differences by age/gender/education – elder personnel tolerate corporate agility to a lesser extent than younger counterpart, while there were very close results in split by gender and education. The overall results are presented in the Appendix 5.

Alteryx allows to analyse and valuate all data in any possible projection. In order to compare how different groups, evaluate the necessity of corporate agility, author has chosen the following groups (see table 1.3):

- By age 31-40 years old – this group has weight circa 30% out of the overall number of respondents. Professionals at this age have a significant experience and a deep professional expertise on the one hand, while still having ambitions and unfulfilled personal carrier goals, which drive them to constructive changes and improvements.
- By education –two subgroups were separately analysed: engineers and those who have no engineering education.
- By gender – subgroups of male and female respondents were compared.

Table 1.3

Comparison of different groups' valuations developed by Author based on Alteryx program data

Group	Nr of respondents	Strategy		Structure		Process		People		Technology		Average
		1. How important are corporate values, corporate goals and clear strategy for the company and its employees?	2. How important is the alignment of the employees personal goals with corporate goals of the company?	3. Please evaluate which organizational structure suits better the flat and flexible or hierarchical and rigid?	4. How important is a cross departments cooperation in the company?	5. Please provide your opinion whether a quick and rapid decisions making process in the company is important?	6. Do you think that high level of bureaucracy (instructions, approvals, limits, paper work and etc.) slow down the development of the company and harm its operations?	7. How important is a support in implementation of employees initiatives and ideas from the company?	8. Do you think that work in non-hierarchical (flat) organization with good cooperation of cross-functional teams, will motivate people to develop passion to work and to become more engaged?	9. How important is a usage of modern software (planning, design, quality control and etc) in the construction industry?	10. Should universities and construction industry develop much deeper cooperation?	
females/ not engineers/ 31-40 y	20	8,55	8,2	6,9	8,6	8,45	7,4	7,95	8,1	8,85	8,55	8,16
females/ engineers/ 31-40 y	47	8,89	8,36	6,57	9,17	8,34	7,74	8,74	8,3	8,96	9,09	8,42
males/engineers/ 31-40 y	81	8,72	8,54	6,74	9,23	8,58	7,72	8,73	7,85	8,64	8,64	8,34
males/ not engineers/ 31-40 y	28	8,14	7,89	5,5	8,93	8,36	6,75	8,18	7,07	8,61	8,14	7,76
Group's average	176	8,58	8,25	6,43	8,98	8,43	7,40	8,40	7,83	8,77	8,61	8,17
		8,41		7,71		7,92		8,12		8,69		
Overall results	508	8,68	8,42	6,70	9,03	8,35	7,59	8,62	7,90	8,78	8,65	8,27
		8,55		7,87		7,97		8,26		8,72		

Analysing the groups presented above the following could be concluded:

- Employees with no engineering education strive towards corporate agility less than those with engineering education. Group of males with other than engineering education showed the lowest level of passion towards corporate agility.
- Males and Females with engineering education found higher necessity of corporate agility in the construction industry. Nevertheless, women were “more agile”.
- Analysing the data in terms of five operating-model dimensions, one may conclude that two (Q3 and Q6) questions related to Structure and Processes received the lowest score. Both have a direct correlation with bureaucracy (instructions, approvals, limits, paperwork etc.) and rigidity of internal hierarchy. There are few potential explanations for such a score:
 - the construction industry is an overregulated industry in general and people are used to this bureaucracy, and think that company operating in this industry should not be over agile;
 - Latvia, in general, is an over-bureaucratic state that has large state sector. Significant number of the participants came from the state sector and such structure fits their preferred way of live;
 - Respondents could have a general tendency of being afraid to take responsibility, and prefer somebody else to decide for them.
- Overall, whether evaluating the results either using five operating model principals or through questions, the final outcome fits the overall picture provided by all respondents.

Summarizing the field research results it was found that all groups provided numbers far higher than “5” in their responses (having an average score of 8,27), and support an aspiration towards corporate agility in the construction sector.

Further data and analysis may be found in Appendices 3, 4 and 5.

The results of the field research confirmed author’s initial assumption, i.e. the need for corporate agility within the construction industry. The following chapter will explore the essence of the construction industry and the research object – a construction company.

2. A construction industry and a construction company

2.1. Construction industry, construction company and particularities of their definitions

Construction industry has a long-standing history. Evolving through the ages, homo sapiens improved their building skills and created monumental structures. However, this required coordination and cooperation of large groups of people. As projects grew in their complexity,, more sophisticated coordination and advanced solutions were introduced. The construction industry and its participants had to undergo changes and transformations,, that has shaped the modern structure and rules the construction companies are following in today.

Based on the field research, which confirmed that there is a demand for corporate agility in the construction companies, further study and investigation of how corporate agility affects and assists in the development, management, and operation of companies in the construction industry is needed.

To facilitate the analysis of factors affecting corporate agility, it is important to understand in detail the definitions of the terms “construction” and “construction companies”. For the purpose of this research, 16 definitions of the term “construction” and 14 definitions of the “construction industry” were analysed (for the full list of definitions please see Appendix 6). A summary of the main activities covered by both terms is presented in Tables 2.1 and 2.2.

The descriptions of main components covered by the terms “construction” and “construction industry” were discussed and approved during the interviews with construction industry experts (see Appendix 6; in accordance with the General Data Protection rules information about the participants is codified). Experts agreed that pure term “construction” should cover as many fields as possible, however it is attributable to actual implementation of building project, sometimes including design. Therefore, civil objects, infrastructure, new construction and/or repair/reconstruction works usually are covered by the term “construction”. On the other hand, the term of “construction industry” is considered to have a broader coverage and it explicitly includes design, maintenance, and material production activities. Experts approved the following definitions of the abovementioned terms:

- **Civil objects**- includes construction of dwelling, offices, warehouses, industrial and public buildings, including internal networks and necessary landscaping works etc.

- **Infrastructure** – includes construction of roads, marine onshore and offshore structures, bridges, external networks, airports, railways, subway, tunnels, etc.;
- **Material production** – facilities needed to produce building materials;
- **New construction** – projects built as a “green field”, including design works;
- **Repair/reconstruction** – works carried out in existing structure/building, including demolition, and design works;
- **Maintenance** – activities performed for operation of the building/structure/utility after the construction works are completed.













For the visualisation of the analysis of definitions, the following symbols are used in tables 2.1. and 2.2.:

- - clearly mentioned.
- ◐ - partly mentioned.
- - is not mentioned.

Table 2.1
The main components covered by the term “construction” (developed by Author)

Definition	Components			
	Civil	Infrastructure	New construction	Repair/reconstruction
1	2	3	4	5
General construction and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and construction of a temporary nature. General construction is the construction of entire dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. This work can be carried out on own account or on a fee or contract basis. Portions of the work and sometimes even the whole practical work can be subcontracted out . (Statistical classification of economic activities in the European Community NACE Rev. 2, 2008).	●	●	●	●

Table 2.1 Continued

1	2	3	4	5
Construction includes the following kinds of works: Residential and industrial Buildings, Commercial and Institutional Buildings, Water and Sewer Line and Related Structures, Oil and Gas Pipeline and Related Structures, Power and Communication Line and Related Structures, Land Subdivision, Highway, Street, and Bridges, Other Heavy and Civil Engineering Construction. (Dong, 2013).				
Construction... includes repair and renovation works in cities, houses, public utilities, retail spaces, offices and infrastructure need to adapt to cope with the increasing number of residents and visitors, urban functions and changing standards. Construction projects contribute to more attractive, sustainable and economically viable urban areas once they are finished. Janne et al., 2018).				
Construction work means the carrying out of any building, civil engineering or engineering construction work and includes: a) the construction, alteration, conversion, fitting out, commissioning, renovation, repair, upkeep, redecoration or other maintenance (including cleaning, which involves the use of water or an abrasive at high pressure, or the use of corrosive or toxic substances), de-commissioning, demolition or dismantling of a structure; b) the preparation for an intended structure, including site clearance, exploration, investigation (but not site survey) and excavation (but not pre-construction archaeological investigations), and the clearance or preparation of the site or structure for use or occupation at its conclusion; c) the assembly on site of prefabricated elements to form a structure or the disassembly on site of the prefabricated elements which, immediately before such disassembly, formed a structure; d) the removal of a structure, or of any product or waste resulting from demolition or dismantling of a structure, or from disassembly of prefabricated elements which immediately before such disassembly formed such a structure; e) the installation, commissioning, maintenance, repair or removal of mechanical, electrical, gas, compressed air, hydraulic, telecommunications, computer or similar services which are normally fixed within or to a structure, but does not include the exploration for, or extraction of, mineral resources, or preparatory activities carried out at a place where such exploration or extraction is carried out. (<i>The Construction and Design Regulations, 2015, UK</i> [accessed on 17 November, 2021]).				

As demonstrated in Table 2.1 there is no one solid definition of “construction”. However, most of the definitions cover under this term both new construction and repair works for the broad list of components, such as residential, office and/or public buildings, industrial and/or marine structures, infrastructure facilities, roads, bridges, tunnels and/or

networks. Table 2.2 will assist analyse the main activities covered by the term “construction industry”.

Table 2.2

The main components covered by the term “construction industry” (developed by Author)

Definition	Components					
	Civil	Infrastructure	Material production	New construction	Repair/ reconstruction	Maintenance
1	2	3	4	5	6	7
The <i>construction industry</i> is a vital component of every OECD economy. The construction sector is responsible for building new houses, apartments, factories, offices, and schools. It also builds roads, bridges, ports, railroads, sewers, and tunnels, among many other things. In addition, it maintains and repairs those structures and produces the basic materials such as concrete that is used to make them. (Competition in the construction industry, OECD, (2008).	●	●	●	●	●	●
The <i>construction sector</i> contains the range of construction products, companies, and construction services firms: a) <i>Construction companies</i> are involved in developing advances building materials, off-site construction, timber products, building systems, insulation products and a range of fittings used in construction and building fit-out; b) <i>Construction service</i> firms operate across civil and structural engineering and contracting, mechanical and electrical contracting power, energy maintenance and generation, quantity surveying and consulting. (<i>Focus on Construction December, 2018.</i>)	●	●	●	◐	○	○
<i>Construction industry</i> , unlike most others, is not a single industry but is made up of several different market areas. For purposes of classification, it can be divided into four areas: Building, Civil engineering, Repair and maintenance, Materials manufacture. (Langford & Male, 2001).	●	◐	●	◐	○	●

Table 2.2 Continued

1	2	3	4	5	6	7
<p>The <i>construction industry</i> is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. It embraces the process by which the said physical infrastructure are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished. The constructed infrastructure include:</p> <p>a) Buildings;</p> <p>b) Transportation systems and facilities including airports, harbours, highways, subways, bridges, railroads, transit systems, pipelines, transmission and power lines;</p> <p>c) Structures for fluid containment, control and distribution such as water treatment and distribution, sewage collection and treatment distribution systems, sedimentation lagoons, dams, and irrigation and canal systems;</p> <p>d) Underground structures, such as tunnels and mines.</p> <p>The <i>industry</i> is comprised of organizations and persons that include companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, builders and merchants. The industry has a close relationship with clients and financiers. The government is involved in the industry as purchaser (client), financier, regulator, and operator. (Construction Industry Policy (2004-2005) National Construction Council).</p>	●	●	●	●	●	●

Similarly, as with the definition of *construction*, one may find no unanimous definition of *construction industry*. Nevertheless, most of the definitions expand on the previously found components (civil, infrastructure, new construction, and repair works) for construction by two additional ones: material manufacturing and maintenance.

Further two important aspects of operation of a *construction company* are technical solutions and legal regulations (both shall be reviewed below). Therefore, considering the analysis above, the following definition (approved by experts, see Appendix 6; in accordance with the General Data Protection rules information about the participants is codified) of a ***construction company*** is suggested for the purposes of this work:

A company that operates in the construction industry (sector), managing and/or performing construction, demolition, reconstruction, maintenance and/or design works that result in creation of the operable building and/or structure and/or plot (or part thereof) according to the Clients ideas and/or needs, while fulfilling the requirements set by laws and regulating normative acts

For the explanation of the words and phrases, included in the definition the Merriam-Webster dictionary (Merriam-Webster Dictionary (2022) [online]) is used.

A company – an association of persons for carrying on a commercial or industrial enterprise or those members of a partnership firm whose names do not appear in the firm name. Author's additional explanation: for a construction industry it is common to call enterprises, organizations and firms in united way – construction companies;

To operate - to perform a function: exert power or influence;

A construction - the process, art, or manner of **constructing** something;

An Industry - a distinct group of productive or profit-making enterprises;

A construction industry – see table 2.2;

To manage - to exercise executive, **administrative**, and supervisory direction of;

To perform - to adhere to the terms of, to fulfil;

A demolition – the act of tearing down;

A reconstruction- the act or process of rebuilding, repairing, or restoring something;

A maintenance – the act of keeping in an existing state (as of repair, efficiency, or validity), act of preserving from failure or decline;

A design – a preliminary sketch or outline showing the main features of something to be executed, act of drawing the plans for;

To result – to have an issue or result;

A creation – the act of making, inventing, or producing;

Operable – fit, possible, or desirable to use, practicable;

A building – a usually roofed and walled structure **built** for permanent use;

A structure – something (such as a building) that is constructed;

A plot – a measured piece of land;

A client – a person who engages the professional advice or services of another, customer;

An idea– a formulated thought or opinion;

A need – a lack of something requisite, desirable, or useful;

A law – a binding custom or practice of a community : a rule of conduct or action prescribed, or formally recognized as binding or enforced by a controlling authority, the whole body of such customs, practices, or rules;

Regulating –bringing under the control of law or constituted authority;

Normative –prescribing norms;

An act – the formal product of a legislative body;

To fulfil – to meet the requirements of;

A requirement – something essential to the existence or occurrence of something else;

To set - to fix or decide on as a time, limit, or regulation.

The main aspect or added value of this definition is a connection between the works carried out by the construction company, client’s needs, and legislation.

As one may find the construction industry includes two different sectors that differ one from another. Performing construction, demolition, reconstruction, maintenance works are all types of “field work”, which require simultaneous coordination a vast number of people, often in severe weather conditions with engagement of low skilled workforce. Yet, design could be a pure office work in a well-organized work environment, which requires involvement of relatively small number of individuals, where primarily white collar workers with higher education. The design phase implies work with minimal limitations, it can also be called an art creation stage. This sows polarity of needs for all governance and management activities, including process management and planning.

2.2. Contemporary Construction Company within a Context of Industry Development

Economic and geopolitical factors impact development of the construction industry. To set the context of main challenges within the industry, the analysis of the industry for the years 2010-2020 in the EU was carried out. Due to the partial unavailability of statistical data, for some indicators the last available year data was used. The author decided to focus on the Baltic States as integral part of the EU (including UK) market -based midsize and **large construction companies**. There is no need to discuss small entities that are agile by essence. Few employees managed by an owner, who plays several roles, while solely making managerial, financial and technical decisions, having in parallel two-three small projects is agile to the core.

The author aims to evaluate how agility affects the performance of the medium and large size construction companies. For that purpose, both supporting and primary activities were analysed and critically discussed. The activities were not studied in detail, analysing the individual effect of each of them on the performance of the construction company, instead the influence of corporate agility on the activities was studied.

Historical Overview on Dynamics of the Industry's Development

Construction industry has a very long-standing history. The first inhabitants of Earth had developed their building skills far before the homo sapiens overtook the stage. Dinosaurs laid their eggs in the nests, while ancient moles were digging their tunnels. Nowadays, some representatives of the monkey species build their shelters from the branches and tree leaves. Initially, our nomadic ancestors used temporary shelters to protect themselves from the climate conditions at the certain time and place. However, with the time transitioning to a settled way of living they recognized that there is no other option but to arrange permanent camps and cities. Humans quite quickly understood that functions of the newly constructed structures are much broader than just ensuring protection from rain.

The growth of the settled population and its social development significantly challenged the skills of builders at the time. They had to solve vital problems originated in climate conditions, neighbours' and nomads' attacks, cattle keeping, harvests storing, melioration, navigation, transportation, religious needs and so on.

Initially, the purpose of built structures was to satisfy basic human needs (shelter, logistics, etc.) through usage of minimally necessary resources. However, within time construction started to serve also needs beyond those that were considered basic. Structures became a symbol of status, pride, power, and intimidation. Comfort and luxury played a significant role not only in cult or rulers' buildings, but also in private projects.

The most ancient building found until now is almost 12 000 years old, a temple at Gobekli Tepe, Turkey (Sagona, 2015).

The construction went through constant development in the last thousands of years. Its methods, materials, equipment, and approaches are continuously improving and are becoming more advanced. Time-periods needed to build Pyramids of Egypt, Colosseum or even castles up to the beginning of the twentieth century are comparable. However, the industrial revolutions affected all areas of human interests, including construction. Appearance of new technologies and materials allowed to speed the processes up (204 m tall

and almost 180 000 m² large J59 building in Chinese Mini Sky City was erected within 19 days) and to embody more complicated and challenging projects such as 828 m tall Burj Khalifa or 164 km long Danyang-Kunshan Grand Bridge.

There is much literature and research devoted to history of mankind which includes description of civil and historically important buildings. According to the author's standpoint the most significant historical and modern structures and their main data is provided in Table 2.3.

Table 2.3.
Significant historical buildings and bridges (created by author)

Buildings		Bridges	
Name	Details	Name	Length
Pyramid of Cheops (Egypt)	Hight: 136.5 m Base area (initially): ≈ 53,000 m ² 2560 BC – 2540 BC (20 years). (Бартон, Р. и др., 1995)	The Mycenaean bridge at Kazarma (Greece) Around 1300BC (Hellenic Ministry of Culture, 2008)	22m
Colosseum or Flavian Amphitheatre (Italy)	Hight: 48 - 50 m Area: 24 000 m ² 72—80 (9 years) (Claridge, 1998)	Ponte di Augusto (Italy), 14-20. (Николаев, 1973).	160m
Parc et château de Versailles (France)	Buffer zone: 94670 m ² Property: 10700 m ² 1645- 1715 (60 years -major works) (Palace and Park of Versailles, 2022, UNESCO)	Ponte Conde de Linhares (India) 1633-1634 (Indiamapped.com accessed, 2021)	3200m
Beijing National Stadium (China)	Height : 69.2 m Gross floor area: 258,000 m ² 2003-2008, (6 years) (Beijing National Stadium, Wikipedia, 2022)	Golden Gate bridge (USA), 1937 https://structurae.net/structures/golden-gate-bridge (accessed, 2021)	Total length 2737.4 m The longest span 1280m
J57 Mini Sky City (China)	Hight: 204 m Area: 179,600 m ² 2015, 19 days http://www.skyscrapercenter.com/building/j57-mini-sky-city/19743 (accessed 2021)	Danyang–Kunshan Grand Bridge (China), 2010 http://www.guinnessworldrecords.com/world-records/longest-bridge (accessed 2021)	164 800 m

According to the observations of the author, not only the spans of bridges or duration of the construction were affected by modern technologies. The height of the buildings was affected dramatically by invention of new materials and methods of construction. Perhaps the stimulus was the myth of Babylon tower that shows the unceasing process of thinking to reach

the sky? Neither the fear of God (s) nor the administrative burdens on the ground could stop it. The Egyptian pyramids remained the highest building on the Earth for thousands of years, until the humans made the next surge. It is obvious that new technologies, population increase, and urbanization process forced architects and engineers to seek for the solutions to allocate maximum people having limited space. The rich and powerful that wanted their own names on the tallest building of the world stepped in this race, offering almost unlimited resources to the man who can satisfy their egos and ambitions. The saying “the sky is the limit” should be perceived literally from now on. Figure. 2.1 demonstrates how rapidly grew and often changed the world’s tallest buildings in the last 130 years.

Many authors who are doing research in the construction industry mention in their research that during the last few thousand years the construction sector has undergone a significant transformation following the social and industrial changes and innovations. These changes (not single-handedly) had a direct impact on the organizational structures, the scale and complexity of the projects, the longevity of the construction period, the materials used, and professionals involved. It is important to point out that construction from the very beginning was and still is a collective activity. The human resources were always a key factor in successful implementation of the project.

External obstacles, such as urbanization, which stimulates fast development of construction industry, the complexity and scale of the structures, sophisticated logistics of materials require large teams to cooperate in order to make projects done qualitatively and within reasonable time schedule. Therefore, to succeed in construction industry, proper organization was and still is required. For instance, according to the research of Parker and Wood on tallest buildings (see figure 2.1.) we can see that during the last 100 years height of buildings has tripled.

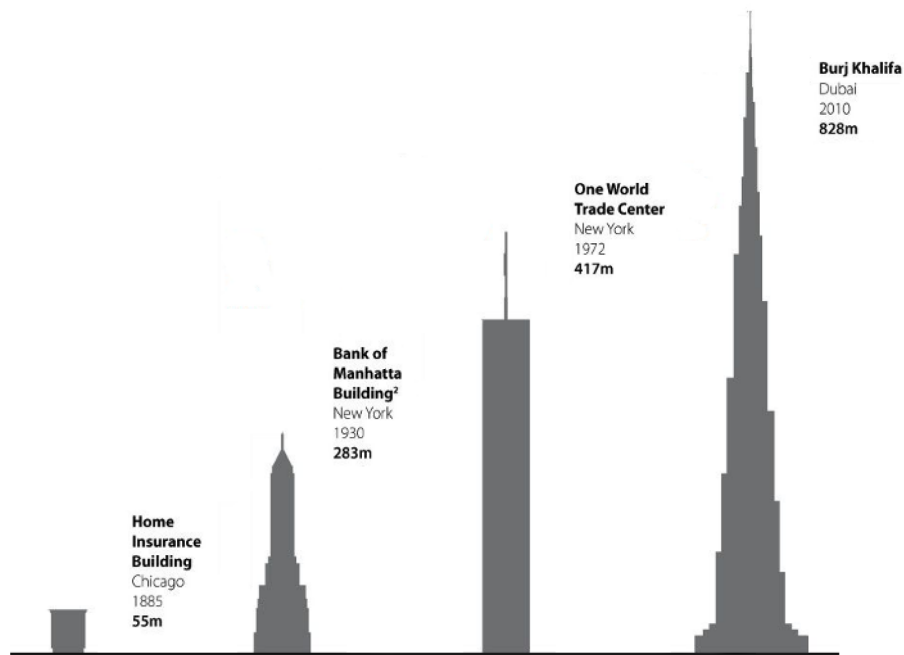


Figure 2.1 Evolution of the tall buildings adapted from Parker, 2013.

Even two-three hundred years ago one man (usually an architect) was responsible for all phases of the construction – the architectural, structural and erection. Males belonging to mid and high social classes usually took up the posts of the architects and construction process leaders. The “blue collars” of that time were mainly cheap workforce mobilized from slaves, serfs, captives, or prisoners. The lacking rights workers started to organize themselves in to artels and guilds. Later labour unions and various professional associations overtook the role of workers protectors and industry regulations’ lobbyists. For instance, Eldring et al. (Eldring et al., 2012), reviewed the case in today’s Norwegian construction industry, where the employer’s organizations allied with the trade unions in support of legal extension of minimum wage provisions in collective agreements.

The time had passed, and the society developed becoming free, specialized, and educated. Nowadays a team of the specialized professionals (architects, structural engineers, utilities designers, foremen, supervisors, etc.) is responsible for the implementation of a building project.

Modern approaches allow to reduce the time of the construction period. Today a skyscraper can be erected within just 2-3 weeks. Powerful equipment and advanced technologies assist builders to materialize structures that cross the seas or cover hundreds of thousands of square meters.

Due to a high importance and substantial health, safety, and environmental risks the construction industry is one of the most regulated industries all over the world. There is a very long list of strict limitations, laws and normative acts in each state, which regulate the design and building process from A to Z. These restrictions and limitations have two main goals as follows:

- to keep the process of construction and its end product as safe and ergonomic as possible;
- to organize, supervise and develop the building environment (land plots' borders, the urban or rural planning and zoning, neighbours, infrastructure, etc.).

All these processes turn construction into a highly bureaucratic and stagnating industry. Figure 1.2 illustrates the number of regulations affecting 3 industries in the United States of America.

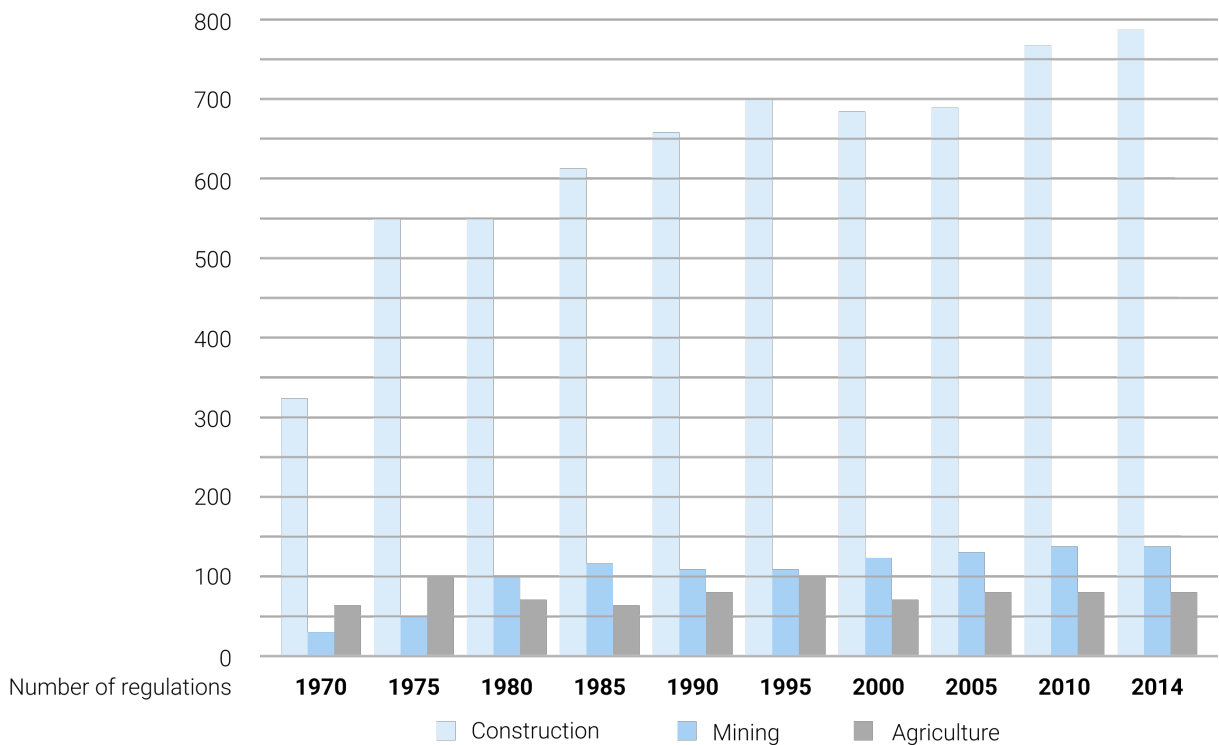


Figure 2.2. US federal regulations directly impacting industry adapted from Barbosa et al. 2017.

Apart from the vast number of regulations needed to design, build, and deliver the construction project, there is another filter to ensure quality and safety of the structure. Each person that undertakes a responsibility for any part of the construction project must obtain

an academic engineering or architectural diploma, work as a trainee for several years, and pass additional exams prior to receiving professional licenses.

Considering the complexity and scale of the modern construction projects, the regulative, social, and financing factors it is obvious that no single individual can successfully and profitably build even one single project. It is obvious that for ensuring success in today's construction industry the team of professionals must be involved, and of long-term vision a company should be established. The ever-changing internal and external environments, large number of employees and stakeholders involved require from the construction business unit to maintain its operation, while it should be able to reorganize/adjust itself and/or to provide prompt response to new challenges within very short time, spending minimal resources. Furthermore, the field research presented in the chapter 1.4, proved the hypothesis of the existing demand for corporate agility within the construction industry. Thus, the author believes that a construction company, as a research object, could be chosen to test assumptions relating to corporate agility and its influence on the performance of the construction company.

2.2.1. Construction industry's statistical overview

The global construction industry is currently going through transformation in many fields, such as urbanization, rapid increase of the population, globalization, changes in geopolitical and economic environments. Industry's development has a direct correlation with growth of the population. Human population has rapidly increased during the last 150 years and is expected to surpass the number of 10 billion by the end of this century (<http://www.worldometers.info/world-population/>). Macomber (Macomber, 2016) found that every year, hundreds of millions of people across the globe move from rural to urban environments in search of opportunity. In a perfect world, governments would have means and the consensus to fund and coordinate the construction of the infrastructure required to sustainably accommodate a rapidly **urbanizing world**.

The population of the EU countries (including UK) significantly grew during the last decades and has exceeded 500 million inhabitants in 2021 (Eurostat data browser, accessed 01 October 2021).

Such rapid **increase in population** size has a directly effect on the global construction industry that should provide a proper solution for the growing burden on the state and

municipal infrastructure including roads, railways, external networks, hospitals, schools, etc., as well as higher demand for the new housing for living and working that should be supplied by state or private developers.

Every year, there is about \$10 trillion (circa 9 trillion EUR) in construction-related spending globally, which is equivalent to 13 % of global gross domestic product (GDP). This makes construction one of the largest sectors of the world's economy that employs 7 % of the world's working population (Barbosa et al., 2017).

The focus of the research is on the Baltic states as European Union member states, therefore, summarized main data that describes the construction industry in the EU28 zone for the last decade was summarized (see Appendix 7). The crisis of 2008 has badly affected real estate and construction sectors, when both reached their peak. The latter, shrinking, balanced and regulated EU construction industry, forced states to interfere more by increasing portion of the state orders.

According to the author's standpoint, the pre-crisis development of the industry was similar to **the global economy development**. It was characterized by euphoria of consumption, easy access to cheap money and a strong belief that this situation will last forever. Booming economy encouraged both private and governmental investments in the real estate and infrastructure. Many of these investments were unreasonably expensive or even risky. The EU construction industry reached its highest turnover of more than 1,94 billion EUR in 2008 (<https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>). This number was surpassed 11 years later, but if the inflation is considered, today's numbers are still lagging. The industry turnover dropped dramatically in 2009, by more than 23%, and continued to shrink for the following four years reaching bottom of 1 494 billion EUR in 2013. The change was not proportional in all the EU economies. Small emerging economies experienced larger reduction during the 2008/2009 crisis – the Baltic States construction sector turnover fell by more than 52%, but it showed its first recovery in 2011. The construction in larger economies such as Spain and Italy shrunk three and almost two times respectively, where Italy is still struggling to show a positive change. At the same time, some countries that had balanced and strict fiscal policies showed minimal or no decline. Austria, Belgium and Germany were minimally affected by the crisis around. The detailed numbers of the historical overview can be found in Appendix 7.

According to statistical data, the broad construction sector in the EU employed 21.1 million people in 2015, a 3.4% increase compared to 2014, but is still 11.8% less than in 2008. The construction sector has been experiencing an ageing workforce, with the share of adults aged 25-49 years old having shrunk from 65.3% in 2008 to 61.8% in 2015, while workers aged 50 to 64 years old have increased from 22.2% to 28% during the same period. This could be due to the lack of attractiveness of the sector to younger workers, among other reasons. The author would like to emphasize, in terms of gender analysis, women represented 16.5% of the total workforce of the EU broad construction sector in 2015 (15.1% in 2008), potentially indicating a general improvement in gender inclusiveness. (European Construction Sector observatory Executive summary, 2017).

Table 2.4. below presents each of the EU 27 countries and the UK population, GDP, volume of the construction sector and its portion of state economy. It allows to understand the scale of the industry and its weight in the GDP of each country. The Baltic States, Cyprus, Sweden and Finland are the countries where construction's share of GDP exceeds the average numbers in the EU. However, there are various reasons for these pure numbers. Sweden and Finland heavily invest in infrastructure projects renewing and building from scratch roads, bridges, tunnels, railways, schools, residential and commercial properties, using both state budget and private financial resources.

Table 2.4.

General economic and construction industry data (created by Author)

Country		Population*	GDP **	Construction industry turnover	% of GDP
		(mln)	(bln eur)	(bln eur)	
		2020	2020	2020	2020
1		2	3	4	5
	EU 28 total	514	14 732	2 008	13,63%
1	Austria	8,90	353,03	55,79	15,80%
2	Belgium	11,55	424,11	77,10	18,18%
3	Bulgaria	6,95	56,87	11,77	20,70%
4	Croatia	4,05	46,06	7,78	16,89%
5	Cyprus	0,88	19,59	4,03	20,57%
6	Czechia	10,69	200,42	34,96	17,44%
7	Denmark	5,82	292,31	40,33	13,80%
8	Estonia	1,32	25,54	5,90	23,10%
9	Finland	5,52	223,22	40,35	18,08%

Table 2.4. Continued

1	2	3	4	5	6
10	France	6,73	2142,21	304,24	14,20%
11	Germany	83,16	3132,30	371,11	11,85%
12	Greece	10,71	155,88	9,58	6,15%
13	Hungary	9,76	127,57	22,21	17,41%
14	Ireland	4,96	344,52	31,00	9,00%
15	Italy	59,64,	1552,50	155,24	10,00%
16	Latvia	1,90	27,57	4,47	16,21%
17	Lithuania	2,79	45,99	7,11	15,46%
18	Luxembourg	0,62	60,29	8,83	14,64%
19	Malta	0,51	12,05	1,48	12,28%
20	Netherlands	17,40	750,75	119,46	15,91%
21	Poland	37,95	488,98	89,74	18,35%
22	Portugal	10,29	190,32	23,67	12,44%
23	Romania	19,32	204,69	26,67	13,03%
24	Slovakia	5,45	86,06	11,37	13,21%
25	Slovenia	2,09	43,52	6,34	14,57%
26	Spain	47,33	1054,40	138,23	13,11%
27	Sweden	10,32	442,44	82,90	18,74%
28	United Kingdom	67,02	2228,41	316,5***	14,20%

* Population on 1 January (2021) Eurostat data browser [accessed 01 October 2021].

Available at: <https://ec.europa.eu/eurostat/databrowser/bookmark/748d68cd-b218-4ec0-9d08-14daf3392532?lang=en>

** GDP (current US\$) - European Union (2020) The world bank data [accessed 08 October 2021]. Available at: <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2020&locations=EU&start=1966&view=chart>

***data for year 2018

At the same time, the main source for the growth of the construction sectors of the Baltics is an extensive EU funds support as well as the EU direct investments. The construction sector of the Western European countries may have the same share of GDP but has a different impact on it. Italy and Germany earmarked about 10-11% of GDP for construction services and products. However, the reasons are very different as well. Italian construction industry played a significant role before the crisis; however, its turnover has been shrinking since 2009. During the crisis, the whole Italian economy was in the very complicated situation, it was saved by huge loans provided by the EU and IMF, while the unnecessary expenditures, including those in infrastructure, were significantly cut. Germany, on the other hand, promotes its high tech and industrial sectors, while construction grows simultaneously with the whole economy, playing a more supporting, rather than a driving role.

Previously mentioned statistical data and facts allow us to presume that, the **construction industry is very fragmented**. The sector is predominantly **formed by mid and small size entities**. There is a continuous growth in number of construction entities since 2010, and it exceeded 3,6 million companies in 2018 (see Appendix 7). The turnover of the construction sector of the EU 28 in the same year (2018) was 1893 bln EUR. These two figures mean that the average turnover of each company was about 526 thousand EUR. However, this average data is not fixed and varies from country to country – in one of the most struggling economies such as one of Greece, this parameter hardly scraps 170 thousand EUR, while an average income of the construction enterprise in Great Britain exceeded value of 900 thousand EUR. In any case, these figures are far from even getting close to the revenue of the large-scale entity that should exceed at least 40 million. The detailed data is available in Appendix 7.

There was a certain construction boom in the 90's of the last century and beginning of the 21-st century. It originated in collapse of the Soviet bloc, growth of Asian countries and overall globalization. The number of the dwelling square meters continues to grow. Various geopolitical and economic factors led to this situation. The collapse of the Soviet block, the end of the Cold War, the increasing **globalization and migration, easy access to the financing**, etc., have created a **new demand for** both civil and infrastructure **development**. Certainly, there are new construction projects nowadays in Europe as well, but the peak was reached. Assuming that buildings should serve 50-100 years, the number of reconstruction and renovations shall increase to maintain existing structures.

Analysis of statistical data allows to conclude that another important factor that directly affects the development of the construction sector is **labour cost per employee** that varies from country to country and may differ tenfold (e.g. Bulgaria or Slovakia v. Denmark or Netherlands). The detailed data is available in Appendix 7. There is a significant gap between old western EU countries and new mainly former communist countries of Eastern Europe. Such great differences support workforce migration from poorer countries to the wealthier ones. The new migrants often leave their families in the country of origin, pay taxes in the new country, while their unemployed family members, principally children and elder parents, overload the weak home economy, benefiting from social and medical services. According to industry experts there is another field that these differences have a direct impact on is the expansion of the construction companies from Eastern Europe to Western markets. **Low**

labour and materials costs allow newcomers to compete with the local players. However, a case when large-scale company from Eastern Europe establishes itself in the West is an exception rather than the rule. Usually, large and financially stable western companies search for small suppliers and subcontractors from the east. The lack of work in the home market, huge difference in size, financial resources and cultural aspects lead small subcontractors to sign a draconic contract and fully rely on the good faith of the general contractor. Very often such “leap of faith” leads to bankruptcy, since large western companies acts formally and see subcontractors as renewable resource. On the other hand, companies that established themselves in the developed markets may enjoy higher profit especially for the products with “added value”, such as combined manufacturing and erection.

Another factor that has a **negative effect** on the whole construction industry is **productivity**. Over decades researchers claimed that productivity is one of the biggest problems of the sector. Companies all over the world are struggling to overcome it.

According to Kless & Stamure (Kless & Stamure, 2019) construction companies in the Baltic States are increasingly forced to compete with companies from other sectors of the economy to provide the necessary resources and with construction companies from abroad who are willing and able to engage in the construction product market.

Labour productivity (see chapter 2.2.3) has a significant impact on each and every factor discussed in the construction. The managerial approaches, motivations, risk management, quality, etc. all these factors are linked to productivity.

Table 2.5

Apparent labour productivity and correction factor (created by author)

Apparent labour productivity ratio (2019 data)							
Country		Apparent labour productivity ** (ths EUR)	Cost of living + rent index* (New York =100)	Latvia Vs country corrected value	Poland Vs country corrected value	Netherlands Vs country corrected value	France Vs country corrected value
1	Latvia	17,9	33,9	1,00	1,41	2,21	2,00
2	Poland	22,8	30,6	0,71	1,00	1,57	1,42
3	Netherlands	69,9	59,9	0,45	0,64	1,00	0,91
4	France	58,6	55,4	0,50	0,70	1,10	1,00

* Europe: Cost of Living Index by Country 2021 (2021) [online]. Numbeo website [accessed 21 March 2022]. Available at: https://www.numbeo.com/cost-of-living/rankings_by_country.jsp?title=2021®ion=150

** Annual detailed enterprise statistics for construction (NACE Rev. 2, F) (2022) [online]. Eurostat data browser [accessed 21 March 2022]. Available at:

https://ec.europa.eu/eurostat/databrowser/view/SBS_NA_CON_R2__custom_2327875/default/table?lang=en

As one may find from Table 2.5 above, elaborated by author, the apparent labour productivity in the construction sector (calculated by Eurostat as gross value added per person employed) varies from country to country. The difference in costs and prices were taken into consideration by adjusting the statistical data via implementation the correction factor of costs of living including rent index. This allows to correct the productivity differences between the countries when costs and price levels are aligned between compared countries. Especially it differs between Eastern and Western parts of the European Union. The “heritage” left by communist regimes in terms of labour culture, attitude towards work, quality etc., still has its influence and slows the development down. For instance, the nominal labour productivity in the Netherlands exceeds that of Latvian worker more than 5 times, while implementing the correction factor it is adjusted “only” to 2,2 times more. The work culture, education and better organized processes are key success factor for improving the productivity.

To illustrate the segmentation and unbalanced situation within the industry author elaborated the Table 2.6. The Table provides data for the 10 largest EU based construction companies. Having a total turnover of 185,5 billion EUR (circa 120 billion in Europe), operating all over the world, employing more than 800 thousand employees, these companies generate only 3,2% profit. Except Vinci, other 9 companies are struggling to rise above 2% in the profit numbers. This table once again illustrates a massive fragmentation of the sector where about 7% of the whole EU 28 construction industry turnover (as of 2017) is “supplied” by 10 companies, while other 3,6 million entities cover the rest. Construction is a scale-based industry and low margins allow to operate only if a company continues to grow and gets bigger, when small percentage is translated into high real numbers.

Table 2.6
Financial data of the 10 largest European construction companies as for 2017 (created by author)*.

	company	turnover (bn EUR)	number of employees	states of operation	% of turnover in EU28 and Norway	Operating profit (bn EUR)	net Profit (bn EUR)	net profit as % of turnover	turnover EU 28+ Norway (bn EUR)
1	2	3	4	5	6	7	8	9	10
1	Vinci (France)	40,248	192 282	116	72%	4,550	2,837	7,0%	28,979
2	ACS (Spain)	34,898	182 269	62	20%	1,626	0,802	2,3%	6,980
3	BOUYGUES (France)	32,904	115 530	90	79%	1,533	1,086	3,3%	25,994
4	Skanska (Sweden)	15,690	40 000	11	64%	0,536	0,401	2,6%	10,042
5	Eiffage (France)	14,976	65 000	50	96%	1,673	0,512	3,4%	14,377

Table 2.6 Continued

1	2	3	4	5	6	7	8	9	10
6	Strabag (Austria)	13,508	72 904	>60	90%	0,448	0,292	2,2%	12,157
7	Ferrovial (Spain)	12,208	95 978	7	59%	-0,638	-0,311	N/A	7,203
8	BalfourBeuty (UK)	9,199	28 000	4	37%	0,165	0,187	2,0%	3,404
9	BAM (Netherlands)	6,604	19 837	>30	93%	0,029	0,013	0,2%	6,166
10	NCC AB (Sweden)	5,322	17 000	4	100%	0,121	0,098	1,8%	5,322
	total	185,557	828 800	N/A	65%	10,042	5,917	3,2%	120,623
	total w/o Vinci	145,309	636 518	N/A	63%	5,492	3,080	2,1%	91,644
	Vinci share out of total volume	21,7%	23,2%	N/A	N/A	45,3%	47,9%	N/A	24%

*1) All data is for 2017 as per companies annual reports, companies websites, bloomberg.com

2) Balfour Beuty monetary data was recalculated according to ECB rate (14 December 2018): EUR 1 = GBP 0.89835

3) NCC monetary data was recalculated according to ECB rate (14 December 2018): EUR 1 = SEK 10,261

4) Strtabag's EU28 and Norway performance % attributable to company's output volume

It is important to note that this margin is not only profit but also a safety net. In case some projects appear to be financially unsuccessful, which happens often in project-based business, company should have resources to support it. It is important to evaluate all risks and circumstances, but usually the consequences of not completing a project and unilateral contract's termination lead to much bigger losses, rather than financial support of particular struggling project until its completion.

Summarising the data and analysis presented in this chapter one can conclude that construction industry on the whole, and in Europe in particular, faces many problems. The heritage of the Cold War, the dependence of the Eastern European countries on the support and dotation from the old members, huge gap in a productivity and standard of living, cultural gaps, segmentation, unpredictable business environment, high bureaucracy, lack of skilled professionals, all these factors force construction companies to search for approaches and tools that would allow to solve or at least to minimize problems mentioned above. **According to the author's point of view, corporate agility could provide an appropriate answer to such demand.** It could reduce the negative impact of the surrounding uncertainty and would allow the necessary reorganization as quickly as possible. In order to understand what are the most significant factors that affect operational activity of a construction company author performed further research that shall be presented in the next chapter.

2.2.2. Determination of the most significant problems in the construction industry – factors affecting operational activities of the construction company

As previously mentioned, construction industry is struggling with:

- Segmentation (Oberlender, 2000);
- low productivity and low technology (Harvey & Ashworth, 1993);
- high level of all kinds of regulatory issues (DeWitt et al., 2005);
- slow pace of modernization (Langford & Male, 2001);
- shortage of workforce (Stevens, 2007);
- skills shortage (European Construction Sector observatory. Executive summary, 2017).

These factors do not allow construction companies to properly and **timely react and face the challenges of modern business environment**. Growing demand for new infrastructure, tough competition, intensive data flow, higher quality and safety demands, clients' wishes to have cheaply operated multifunctional buildings, lack of skilled professionals, etc., force construction organizations to reconsider their approaches and methods of daily operation.

Construction is a turnover based business with very **low profit margins** (see table 2.6.). The costs of materials, equipment and wages leave almost no room for intangible added-value, that could be converted into the bigger profit. This situation puts most of the companies in front of **dilemma** either to **invest in** own fleet of machines and perform the works with own **manpower**, or to operate relying on the employed engineers that **manage subcontractors**. The latter approach allows for better flexibility on the shrinking market, while the former strengthens the company's position in growing business environment accompanied by a scarcity of the manpower.

Apart from the abovementioned dilemma, there are new challenges that require respective action from the construction industry's players. For instance, according to R. Rajasekhar (Rajasekhar, 2017) now the world is moving rapidly toward globalization, in this environment, many multinational companies are awarded business in other countries in which they are competing with local companies. Both multinational and local construction companies should seriously look forward to improving their performance.

According to Kauskale et al. (Kauskale et al., 2017) the importance of environmental aspects in construction is growing as well.

EU commission as part of Europe 2020 initiative addressed five areas in the construction field to be improved and promoted (Construction sector competitiveness by European Commission, 2022):

1. Financing and digitalization;
2. Skills and qualifications;
3. Resource efficiency;
4. Regulatory framework;
5. International competition.

The construction process is highly complicated, one that requires a large number of people to be involved and consumes significant resources. Coordination of large teams, sophisticated supply chain solutions, tough schedule, high risks, over-regulated environment, vast number of stakeholders and subcontractors - collectively these warrant an outstanding operational behaviour, financial stability, and a well-planned future strategy and development.

Such **ever-changing business environment requires** the company to show **great flexibility** in order to maintain its competitive advantages. New organizational practices, new corporate structures, new patterns of organizational behaviour and investment in human capital become a daily challenge for any entity. **As a result, new and advanced operational approaches are necessary.** It is fact that well-planned and well-managed operational activities play a key role in the survival of a modern construction company. Author decided **to determine the key factors that affect operational activities of the construction company.** Following the findings of academic researches and interviews with the industry's experts, a demand for improvement of a construction company's operational activities was identified. The **methodology used for this research includes** the following methods: **literature overview, qualitative content analysis and interviews with industry professionals.**

The research was conducted in the period from **April to September 2021.** For **systematic literature overview** *Scopus* and *Web of Science* databases were used for search of the literature sources, as well as Google Scholar and other academic and business articles as supportive databases. The search was limited to "title" or "abstract" or "keywords" for combination of terms "construction company", "operation", "factor", "performance", "risks", "industry" in different combinations. Such approach **resulted in 87 records in Web of Science, 419 records in Scopus data base, and 17 articles were found through manual search.** After

elimination of duplicates, review of titles and abstracts, performing additional filtering, 38 sources were chosen for further research (see fig. 2.3.).

Table 2.7

Literature search and selection process. Adopted from Page et al., 2021

Phase	Sources		
	Web of Science	Scopus	Manual search
Identification	87	419	17
Screening	total		
	523		
	duplicates		
	61		
	total w/o duplicates		
	462		
	title filtering		
	213		
	total after title filtering		
	249		
	abstract filtering		
	197		
	total after abstract filtering		
52			
detailed review filtering			
14			
Inclusion in the research	total after detailed filtering		
	38		

To identify the main factors that affect operation of the construction company **literature overview of 38 sources was performed (for the full list of analysed sources and detailed tables see Appendix 8)** and, the main factors were identified, using detailed content analysis method.

Amid works of Cakmak & Tasb, Isik et al., Cheah & Garvin, Carrillo et al., Bhattacharya et al., Vele, Hitt, Tansey et al., Salleh et al, Rodionova & Vlasenko, Lidelöw & Simu, Bamindele Rotimi & Ramanayaka, Jędrzejczak-Gas, Lukmanova & Yaskova, Lovrencic et al., Kliuchnikova & Pobegaylov, Puchýř & Solodilova, Antlova, Wibowoa & Waluyo, Adeleke et al., Anif et al., Tama et al., Hamouda, Valverde-Gascueña et al., Dakhli et al., Fazinga et al., Van Dijkhuizen et al., Adeleke et al., Bitamba & An, Obodo et al., Fazinga et al., Vrijhoef, Snyman & Smallwood, Robles et al., Soewin & Chinda, Dixit & Mandal, Mollo et al., Vrijhoef & Van Dijkhuizen (full list of references are showed in Appendix 8) **667 codes were identified, the qualitative data was labeled and categorized into 13 significant factors**, which in turn formed external, internal and reciprocal major domains.

Based on the performed systematic literature overview and validated through interviews with experts (see Appendix 9; in accordance with General Data Protection rules information about the participants is codified)), notions of domains and factors were assumed as follows:

- **Internal domain** – domain consists of factors influencing a company from inside, often controlled and managed by organization.
- **External domain** – domain consists of factors influencing a company from outside, often out of company's control.
- **Reciprocal domain** – domain consists of factors influencing company from inside and outside, which often can be controlled and managed, at least partly, by an organization.
- **Stakeholders management factor** – issues related to the stakeholders, third parties, subcontractors, suppliers, shareholders, coordinating and regulating institutions, not including employees (considered under Human resources).
- **PR and communication factor**– PR, communication (external and internal), marketing, image, reputation and other related activities.
- **Availability of resources factor**– all resources needed (mainly equipment, machinery and materials) for the implementation of the projects and daily operation, apart from human and financial resources.
- **PESTEL factor**– Political, Economic, Social, Technological, Environmental, Legal factors that affects a company from outside, and are beyond company's control.
- **Globalization factor**– external factors and data affecting entrance and operation in the new market(s), international competition, or influence of the international companies on the local companies and/or market.
- **Risk management factor**– all risks related issues, including health and safety.
- **Human resources factor**- all issues related to the employees, trainings, motivation, education, wages, compensations, development, etc.
- **Financial resources factor**– Availability of the financial assets/tools, financial stability, cash flow, profitability, leverage, loans, guarantees, bonds, insurances, etc.

- **Targets factor**– corporate and project goals and activities needed for their achievement.
- **Structure and organizational behaviour factor**– organizational structure, necessary corporate functions both primary and supportive, including split by departments, climate of the company, its values, corporate beliefs, and corresponding behaviour.
- **Quality of processes' management factor**– management of internal processes needed to ensure operation of the company and project delivery (project management, knowledge sharing, ensuring works quality, control, reporting, supervision, costs estimation, productivity, works coordination, etc.).
- **Short-term planning factor**– issues related to the short-term planning of activities and works, projects time schedules, milestones, etc.
- **Strategic long-term planning factor**– issues related to the strategic planning and long-term development, forecasts, key decisions related to the future activities of the company.

The factors affecting operational activities of the construction company are presented in Figure 2.3 **There are 13 significant factors, generated from 667 codes**, which were determined using the systematic literature review and qualitative content analysis. Each factor includes several attributable codes (frequency) and a respective percentage out of total number of codes (667). The author found that there are factors, which have versatile effect and have a different origin. **The determined 13 significant factors affecting operational activities of the construction company are grouped in three major domains – internal, external and reciprocal.** Each domain includes number of attributable factors (for more precise analysis the frequency of codes of respective factors was used) and respective percentage out of total number of codes (667) that form 13 factors. See Table 2.8 and Appendix 8 for the results.

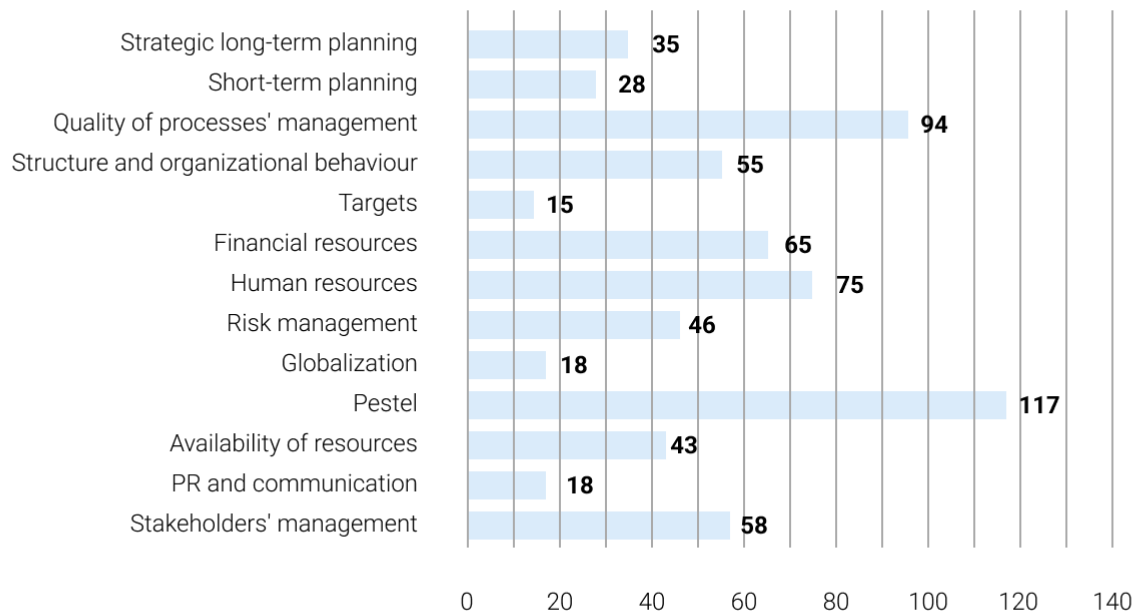


Figure 2.3 The weight of the factors affecting operational activity of the company (frequency 667 in total) developed by author.

Analysis of the research results

As previously mentioned, the author used systematic literature overview and validated the results through in-depth interviews with construction industry experts (see Appendix 9). To confirm results four industry experts with working experience more that ten years within the industry were interviewed. Interviews were organized during the period from September to November 2021. In accordance with the General Data Protection rules, information about the participants is codified. Based on the received results and considering experts opinions, the following explanation and discussion was put forward.

PESTEL –an external factor of political, economic, social, technological, environmental, and legal aspects, which received the highest weight of 17,5%. Such sizeable percentage can be explained by the high regulation of the industry by state and municipal institutions. Often, political decisions affect the whole industry. The scale of the projects, high role of public sector customers, and a deep contractor’s dependence on such external factors as environmental, social and legal ones, add value to this factor. The construction sites characteristics such climate, ground water, soil conditions, environmental requirements, location etc., have a significant impact on construction company’s daily operation and development. It is important

to emphasize that a contractor has no influence on these external factors and can only adjust his operational and strategic activities accordingly.

Quality of processes' management -received the second highest frequency of 14,1% among the detected factors. According to the definition, this section includes the vast number of internal processes affecting the company's daily business. All these processes are vital for the corporate success. Project management as a core process within the construction company, was mentioned by many sources as one of the crucial factors influencing the construction company. It includes knowledge sharing, and other technological processes such as works coordination and control, organization of the site, product quality control, cost estimation and so on. At the same time, other administrative processes were considered important as well, especially those attributable to legal and top management involvement. Construction projects are large scale, sometimes a project costs may surpass the turnover of the company. Low margin and high risks force contractors to work hard on efficiency and quality, since any mistake may lead to huge financial loses.

Human resources – is the third factor with 11,2% weight. Typically, the product delivered by any organization is done by its personnel. A construction company is not an exception, but any construction product requires involvement of a vast number of people. Hundreds of workers on one construction site are a part of the daily routine for any construction company. The large number persons involved in the industry in general and on the construction site in particular award an immense importance to the motivation, skills, education and training of the staff. Unprofessional and demotivated personnel will not be able to do the works on time, in required quality and within budget. Thus, matters of fair wages and compensations, professional training and appropriate motivation program are regarded as paramount.

Financial resources –this factor scored 9,7% of importance amid others. The financial resource (financial assets/tools, financial stability, cash flow, maintaining profitability, leverage, loans, guarantees, bonds, insurances, etc) is one of the key factors that has direct impact on the operation of the construction company. Bonds and insurances are a daily practice and contractor cannot even start works, prior to submission of the papers mentioned above. As already discussed, high costs at low margin lead the construction companies to pay special attention to the financial issues. Negative cash flow can kill no less than losses at the

end, lack of ability to provide performance bond may lead to the exclusion from the participants list. Late payment for materials or to the subcontractor may delay the whole project. Financial stability and working capital in the construction industry take the first row among the tools a contractor, particularly a general contractor, usually manages. High segmentation of the market creates reality, in which several big companies win large portion of the tenders and later “distribute” works among subcontractors. Most of these suppliers and subcontractors cannot finance project expenses as per cash flow with the client, thus general contractor is forced to pay huge sums ahead of receiving it from the customer, just to help subcontractors survive and finish their work on time.

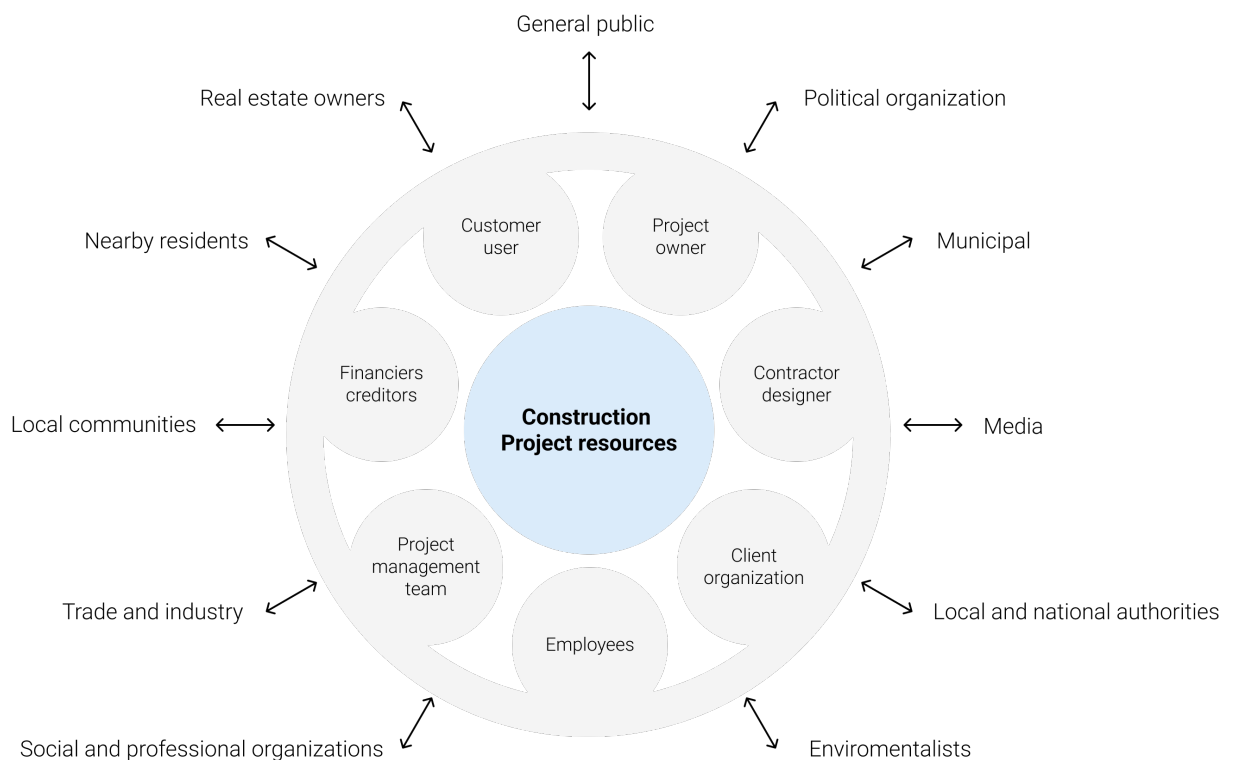


Figure 2.4 Construction project stakeholders adapted from Leung & Olomolaiye, 2010.

Stakeholders’ management – a factor with the weight of 8,7%. It is one of the three reciprocal factors. This dual affiliation originates in the fact that most of all stakeholders influence the company from outside, while the policy on how to treat them, what collaboration approach to accept are being implemented internally (see fig 2.4). There are several groups of stakeholders the construction company works with. Different governmental and municipal institutions that are responsible for coordination and acceptance of the project

from formal point of view. Further stakeholders are non-governmental organizations, and third parties are responsible for coordination of particular, often niche, aspects of the project. The most important stakeholders are clients and their representative (designer, Engineer, technical supervisor, marketing specialists, project manager, etc.). The relationship with the client is the most complicated and is of utmost importance for any construction company. Whether it is a state client or a private one, contractors have an underdog position and should approach a client with maximum diplomacy and agility in order not to get penalized. Other important players among the stakeholders are financial and insurance institutions. The importance of availability of working capital, credit lines and bonds were discussed “Financial resources” section above. The last but not least, stakeholders are shareholders. Depending on the structure of the company, these can be totally independent parties with no direct involvement (for instance minor shareholders of listed companies) or a controlling majority or family owners in private entities who have significant influence on what happens with their assets. In any of these cases incorrect approach or destroyed relationship may drive project or even whole company down.

Structure and organizational behaviour – a factor with the weight of 8,2%. Appropriately organized corporate structure, reduction of unnecessary bureaucracy, effective cross departmental cooperation, involvement of supportive functions of the company in its core operational activity, corporate values, positive work environment – all these elements support both correct organizational behaviour and atmosphere of internal cooperation and involvement. The proper definition of necessary functions and their subordination under clear organizational chart is highly important.

Risk Management – the factor with 6,9% weight. Construction processes combine several factors that increase risks. Risk management is an integral part of all construction processes starting from general strategies and potential threats and opportunities identification, through health and safety of the personnel and to the production and construction risks on the site. Vast number of people are involved, where works occur in hard conditions (height, climate, under water, underground etc.) using heavy machinery and equipment. As noted above, lack of proper planning and lack of professional staff raise chances for accidents. Apart from the construction technological risks, there are many business risks, which should be managed and evaluated prior to entering any project. Financial and contractual risks often prevail over any technical risk, so top management might decide

not to participate in a tender, or, the opposite, acknowledgement of such risks allows to monetarize them and win tender with correct price.

Availability of resources – a factor with 6,4% weight. Construction is the resource consuming industry; no company can operate without investing and planning supply chains of materials and equipment delivery to the site. Lack of one component may stop all works, wrong material may cause significant reworks, while both lead to losses. As discussed above, very few suppliers or subcontractors are ready to accept the payment conditions offered by the client, therefore timely planning and payments are the responsibility of the general contractor. There are regions with very limited availability of necessary equipment and/or materials. All this should be taken into consideration while final price and schedule are being prepared, especially in the present climate when logistics becomes much less predictable. Availability of the resources was attributed to reciprocal domain. It was done so due to the dual nature of potential un/availability of the resources. The wrong planning or management are covered by other factors, while here the issue of unavailability of the resources may originate outside as well as inside the construction company. If region the project is located in lacks particular resources it is considered as an external factor, while if company lacks internal resources such as machinery or own queries it is considered as an internal one. The decision whether to outsource equipment and materials or to own them is part of the strategic planning and development concept of the company. Hence both have positive and negative aspects.

Strategic long-term planning – this factor of 5,2% weight has a direct correlation with the Targets factor. Planning, or more precisely, lack of planning is one of the biggest problems in the construction industry. Frequently, money and other resources are misdirected due to the wrong or defective planning. Lack of strategy and tactics often places organizations among outsiders. The inertia, caused by the scale of the companies, does not allow for their quick reorganization, unless a company has developed an agile structure and approach. Role of strategic planning is sometimes undervalued when talking about operational activities. Such an approach is flawed. Clear development vision, goals and positive plans for the future, shape a comfortable environment for the employees, increase their trust in the organization they work for. Strategic long-term planning reflects the problems a company faced in the past. For instance, if there is an anticipation for the boom, the strategic solution would be to purchase heavy machinery and hire additional staff, to reduce dependence on the subcontractors or

external suppliers, and by doing so minimize company's expenditure increase. Such actions directly affect the operational activity. Other, less positive actions, such as selling assets or reducing number of staff, will also be known to other employees, but with timely and correct communication, these unpleasant issues can be turned into positive ones that are dedicated to the strengthening of the company.

Short-term planning – a factor obtained 4,2% weight. The short-term planning should be considered together with the factor of processes' management. Planning, or more precisely, lack of planning is one of biggest obstacles of the construction industry. Many sources point out that lack of a capable project management team that can plan properly is the source of most problems. Short-term planning includes not only time schedules with the clients, but all internal schedules and milestones needed to achieve short-term goals. The timely and planned personnel recruitment, cost estimation done ahead of schedule, or a forgotten submission of the tender - all these have an immediate influence on the contractor's operational activity.

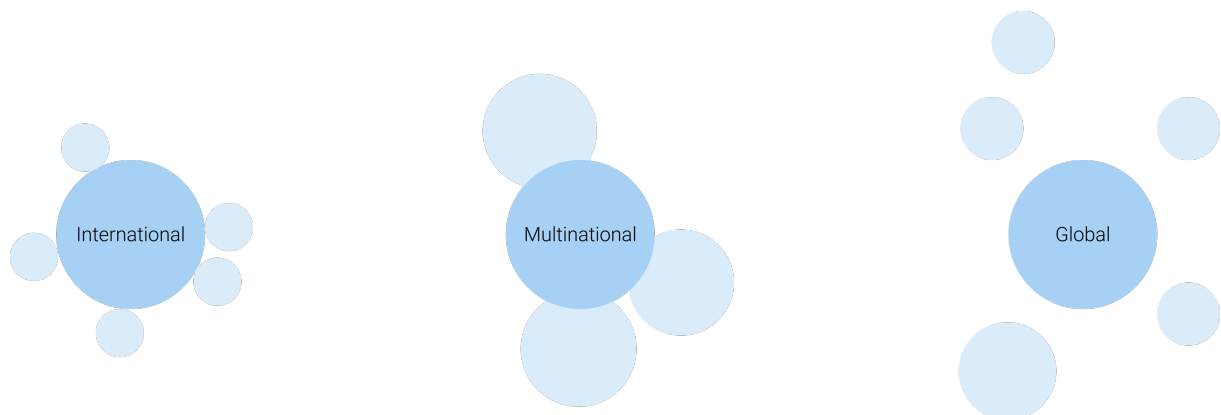


Figure 2.5 International, Multinational and Global construction companies adapted from Flanagan, 1994.

Globalization – a factor with only 2,7%. Globalization did not get many points, but is still an important factor especially today when low margins and large scale of the projects force construction organizations to seek further development outside the area they are used to reside in. Furthermore, when global companies enter new relatively small local markets, they create new rules and new environment. Langford & Male (Langford & Male, 2001) distinguish between international, multinational, and global firms (see Figure 2.5). While many construction firms can be described as international in scope few would be typified as being 'global' or even multinational. An international firm has a large domestic market and

dependent satellites in several countries. A global firm has a home base, but brands independent companies around the world. This external factor affects companies while companies have little or no influence over it. International competition and globalization have increased in the last two decades. Materials or elements produced in one part of the world are ordered, delivered, and installed on other continents on the daily basis. At the same time, trade wars, sanctions and political crises in one country may affect businesses thousands of kilometres away. Large scale project, worth billions, in a small market almost automatically excludes local participants from the loop of general contractors. Consequently, they have to adjust their operational and tactical activities to take part in such tender, either by joining large international company as a minority partner in the joint venture, or by choosing role of a subcontractor. Author decided to outline globalization factor separately due to the increasing role of international cooperation and mutual influence caused by different global events.

PR and communication – are one of the last factors scoring the weight of 2,7%. Public relations and communication are also one of the reciprocal factors since, among other elements, it includes external and internal communications, perception of the company by external stakeholders and its employees, reputation, marketing activities, etc. As mentioned above, in the industry where credit line is almost a must, with low trust among stakeholders, a reputation of the company and its internal and external communication plays a huge role especially for the employees, partners, subcontractors, and private customers. When an employee chooses where he or she wants to work he/she subconsciously identifies what people think about company and projects it to his/her own image. The same is true for the clients. Bad reputation (low quality experience) of the contractor may decrease the apartment sales of the real estate developer or put the delivery terms under threat. If subcontractors always do all they can to complete the job well and on time, it is then much easier for them to negotiate better payment terms with the general contractor. External communication, especially with principal stakeholders is highly important. One should recall that a contractor almost always starts a few levels below the client or the state institution, while most of the risks still fall with the contractor. Therefore, flexible approach, diplomatic language and creative solutions for complicated situations are the tools contractor's representative should use before lawyers are involved. Internal communication is no less, but sometimes more important than external. The employees know almost everything that happens within the

company. Concealing the truth from them may solve a problem for a day or two, but it will cause a fire when it comes out. On the other hand, well balanced and necessary limited communication of important data and information creates a trust circle among management and employees, which in its turn strengthen the organization.

Targets – the last factor with only 2,2% weight. However, sources pointed it out as an important and independent factor. There is a high number of technical staff working within the construction industry. Many of them are highly goal-oriented and the final result is important for them. They hardly operate in the environment without schedules, milestones and aims. The targets should be set for both, the whole projects or subproject tasks and for the company itself.

The weight of the domains and factors affecting the operational activity of the construction company are presented in the Table 2.8.

Another interesting angle to analyse the results of the research is to explore which factors external, internal, or reciprocal affect the operational activities more. Prior to the research completion, the immediate answer would have been that internal factors have the largest influence on the operational activities. All classical notions of proper processes, structure, planning, finance etc., were expected to take the centre stage, leaving small room for others. However, the results slightly differed. Pure internal factors occupied only about 62%, while pure external factors exceeded the bar of 20%. The reciprocal factors showed an interesting output that almost reached the external factors with the score of almost 18%. Among the reciprocal factors stakeholders' management and availability of resources have a total input of circa 15%, while those two factors have more external influence portion rather than internal. This means that external factors, especially in the age of globalization have a significant impact on the operational activity of the construction company.

Table 2.8

The weight of the factors affecting operational activity of the company

#	Factor	Domain	Frequency	%
1	2	3	4	5
1	Stakeholders management	Reciprocal	119	17,8%
2	PR and Communication			
3	Availability of resources			
4	Pestel	External	135	20,3%
5	Globalization			
6	Risk management	Internal	413	61,9%
7	Human resources			
8	Financial resources			

Table 2.8 Continued

1	2	3	4	5
9	Targets			
10	Structure and organizational behaviour			
11	Quality of processes' management			
12	Short-term planning			
13	Strategic long-term planning			
Total			667	100%

Summarizing the factors determined above one may find that **modern construction company faces multiple challenges in different fields**. Certainly, each problem has to be evaluated and proper solution should be set individually to each company, but most of them can be summed up as a struggling with timely determination of the problem, providing quick response to it, whilst using the minimum of the available resources.

Overregulation of the industry, low professional and managerial skills of the personnel, bureaucracy and sophisticated over controlled internal procedures do not allow company not only to act proactively, but even to provide a quick response to problem or new requirement and/or to perform necessary reorganization if needed. According to Stevens (Stevens, 2007) the fast eat the slow in the construction business. This inertia is causing direct financial losses and harm communication and relations with both internal and external stakeholders.

As one may see, there several significant factors negatively influence activities of the construction company. The substantial analysis of construction company's structure, its primary and support activities is needed to elaborate the cure for this lack of flexibility in ever changing business environment, which in turn highlights **the importance of the corporate agility**.

3. Analysis of the Construction Company within a Concept of Corporate Agility

In the first and second chapters of this research definitions of corporate agility, organizational behaviour and corporate governance are developed and validated. According to these definitions **corporate agility depends on construction company's ability to use inner capacity for efficient and effective reaction to external and internal events**. Subsequently, it is necessary to **analyse typical construction companies in the Baltic Region**, their structures, processes for value creation as well as how these processes are embedded in the company strategy.

In order to evaluate corporate agility, a comprehensive study of the essence and structure of the construction company should be performed. Greater understanding of its organizational behaviour and a possible "therapy treatment" for improvement or reorganization towards corporate agility should be analysed.

3.1. Structure of a "typical" construction company in the Baltic region

In the first part of the research several management theories were analysed. Among them – was a widely used M. Webber study about bureaucratic organizations. A bureaucratic organizational form, as Weber describes it, is marked by hierarchy, division of labour and routines. Hierarchy entails superior and subordinate positions and various vertical levels in an organization. Division of labour means that an organization's tasks are grouped into different units and tied to concrete positions (Christensen et al., 2007). Analysing this description, it is obvious that **many construction companies in the Baltic Region have bureaucratic organization background**.

To identify necessary functions of the construction company as a bureaucratic organization, the author conducted literature overview. Author used *Scopus* and *Web of Science* databases for search of the literature sources, and Google Scholar and other academic and business articles as supportive databases. The search was limited to "title" or "abstract" or "keywords" for the terms "functions of construction company", "operation of construction company", "structure of construction company" in different combinations. Such approach resulted in **287 records in Web of Science, 2419 records in Scopus data base, and 48** articles were found through manual search. After elimination of duplicates, review of titles and

abstracts, performing additional filtering the chosen sources and necessary functions of the construction company are presented in table 3.1.

Table 3.1

The necessary functions of a construction company developed by Author

№	Functions to be obtained in the construction company	Reference ²
1	Strategic and overall management	Lidelöw & Simu (2015), Kliuchnikova & Pobegaylov (2016), Vrijhoef (2016), Kähkönen & Sexton (2005); Stevens (2007); Nunnally (2007); Parada (2020); Barbosa et al. (2017); Mintzberg et al. (2006); DeWitt et al. (2005); Oberlender (2000); Construction Blueprint consortium / FLC report (2020); Obodo et al 2021, Hitt 2016
2	Preparation and submission of tender documentation	DeWitt et al. (2005) Stevens (2007); Nunnally (2007); Parada (2020); Barbosa et al. (2017); Oberlender (2000); Kähkönen & Sexton (2005); Obodo et al. (2021), Carrillo et al. (2000)
3	Cost estimation	Obodo et al. (2021), Parada (2020); Stevens (2007); Nunnally (2007); Barbosa et al. (2017); Oberlender (2000); Kähkönen & Sexton (2005); DeWitt et al. (2005), Vrijhoef & Dijkhuizen (2020)
4	Legal	Gorse (2003); DeWitt et al. (2005); Motzko et al. (2013); Stevens (2007); Brockman (2012); Nunnally (2007); Kliuchnikova & Pobegaylov (2016); Lidelöw & Simu (2015); Hitt (2016)
5	Financial, including bookkeeping	Cardoso et al. (2015); Motzko et al. (2013); Ng (2004); Kliuchnikova & Pobegaylov (2016); Dan-Asabe&Radosavljevic (2009); Vrijhoef & Dijkhuizen (2020); Carrillo et al. (2000)
6	PR and communication	Kähkönen & Sexton (2005); Brockman (2012); Lundberg & Lidelöw (2015); Dan-Asabe& Radosavljevic (2009); Lidelöw & Simu (2015); Carrillo et al. (2000)
7	Quality management and assurance	Brooks & Spillane (2016); Brockman (2012); Lundberg & Lidelöw (2015); Ng (2004); Vrijhoef & Dijkhuizen (2020); Carrillo et al. (2000)
8	Administrative (IT, office maintenance and infrastructure)	Lidelöw & Simu (2015); Šiškina et al. (2009); Martin (2017); Lundberg & Lidelöw (2015); Hitt (2016); Carrillo et al. (2000)
9	Health and safety	Rajasekhar (2017), Stevens (2007); Nunnally (2007); Parada (2020); Barbosa et al. (2017); DeWitt et al. (2005); Oberlender (2000); Ng (2004); Brockman (2012); Kähkönen & Sexton (2005)
10	Procurement (purchasing)	Vrijhoef & Dijkhuizen (2020); Benheim and Birchall (1999); Green et al. (2004); Stevens (2007); Brockman (2012); Kähkönen & Sexton (2005); Obodo et al. (2021)
11	Engineering support	Vrijhoef (2016); DeWitt et al. (2005); Oberlender (2000); Stevens (2007); Kähkönen & Sexton (2005); Snyman & Smallwood (2017)
12	Construction projects implementation, including design and maintenance	Snyman & Smallwood (2017); Vrijhoef & Dijkhuizen (2020); Rajasekhar (2017); Stevens (2007); Nunnally (2007); Parada (2020); Barbosa et al. (2017); DeWitt et al. (2005) Oberlender (2000); Ng (2004); Kähkönen & Sexton (2005); Robles et al. (2014), Vrijhoef (2016), Hitt (2016);
13	Human resources	Snyman & Smallwood (2017); Robles et al. (2014); Eaton (2008); Ritz (1994); Brooks & Spillane (2016); Friberg & Eldring (2013); Eldring et al. (2012); Siew (2014); Hitt (2016); Cardoso et al. (2015); Ng (2004); Stevens (2007)
14	Equipment and material stock maintenance	Stevens (2007); Nunnally (2007); Parada (2020); Barbosa et al. (2017); DeWitt et al. (2005); Oberlender (2000); Ng (2004); Kähkönen & Sexton (2005); Robles et al. (2014); Vrijhoef (2016); Hitt (2016)

² For the details of authors and publications please see the list of bibliography

The functions presented in the table are the areas that construction organization should cover in order to exist and successfully operate. These functions may be covered via different organizational structures. For example, Urwick (Urwick, 1938) concluded that no executive should attempt to directly supervise the work of more than five or at the most six direct subordinates whose work interlocks. Functions of the construction company could be classified by different parameters. For example:

- According to type of activities. Corresponding to M. Porter model there are primary and secondary activities which leads to profit margin (see chapter 3.2.);
- According to the organizational structure, so called ownership of the functions. This is a possibility to work in divisions and subdivisions, to employ organizational structure (see fig. 3.1.);

Structure of any construction company should be analysed considering its functions. There is a “typical” organizational structure of the construction companies. See Appendices 10 and 11 for the organizational scheme of a “typical” construction company and its functions.

The functions may be divided by separate department, or there might be several functions united under “one umbrella”. Certainly, the latter assumes a reasonable synergy amid the functions. Synergy, according to Geipele et. al.(Geipele et al., 2018), is a interaction of two or more system elements that produce a combined effect greater than the sum of their separate effects. The additional effect, or the difference that is created from such an interaction, is called synergy effect or synergistic effect. For instance, engineering support, cost estimators and tender preparation teams may be “compacted” in one, covering different parts of the same projects. On the other hand, the same tender preparation specialists may join legal team, since both have a lot of synergy in their daily operations as well. There is no reason to unite bookkeeping with project management team, since they work in totally different fields, and have minimal synergy. The latter does not mean that there is no or there should not be any cooperation. On the contrary, the necessity of cross departmental cooperation is vital, and shall be reviewed latter.

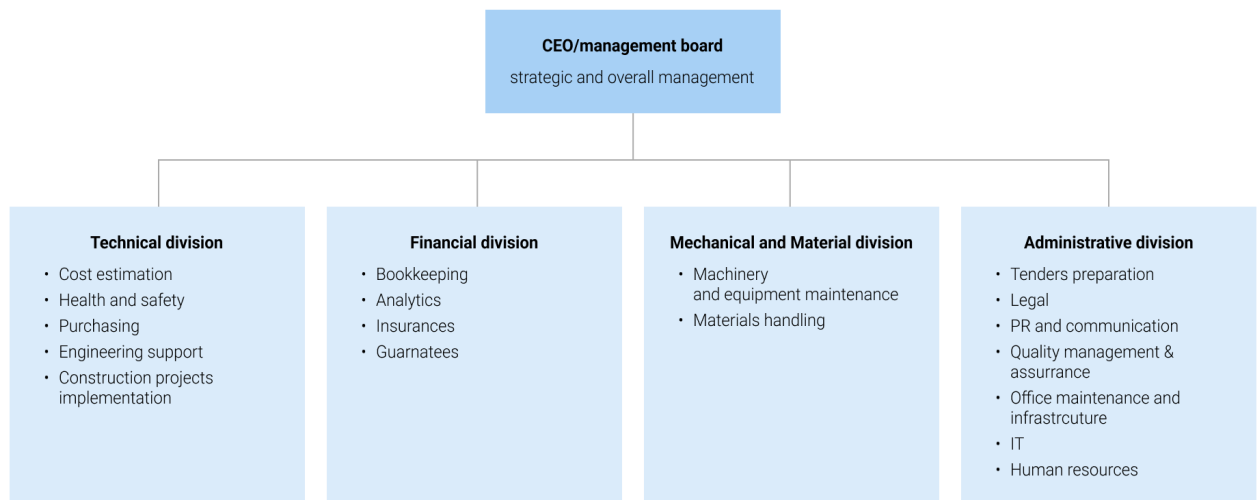


Figure 3.1 Distribution of functions in a “typical” construction company developed by author, validated by experts (see Appendix 10).

Aiming to analyse construction companies’ structure and functions in Latvia, Author interviewed 4 (four) large Latvian and international companies’ executives (as industry experts) in the period from November, 2020 to February, 2021. Information on interviews results is available in Appendices 10 and 11. In accordance with the General Data Protection rules, information about the participants is codified.

Author discussed with construction industry executives a typical structure of the construction company with an aim to identify necessary functions (see Appendix 11). The experts reviewed structures and functions of several large and mid-size construction companies. Most of the companies have similar ideology for structure and cooperation between different departments. A distribution of functions in the “typical” large/midsize construction company is shown in fig. 3.1.

Another subject discussed with the experts, and validated through corporate laws and practices of the EU, was the transnational structure of international companies (see Appendix 12). The experts shared their opinion on process of establishment of the local operation, its registration and management, and legal risks. In order to analyse construction companies’ structure and functions in Latvia, author interviewed two large Latvian and international companies’ executives (as industry experts) and two lawyers working in the construction industry. Information from the interviews results is available in Appendix 12.

Even operating in the EU, all big international companies have split their the work by regions and these local business units usually have most of the departments in-house and make minimal or no use of head quarters’ resources. The distribution of functions shown in

figure 3.1 fits both local and multinational companies. Appendix 11 provides structure of the mid-size/large local company or branch of an international company of the comparable size. Depending on the scale of operation in a particular country, for example, having few mid-size or even one large project, “localization” is a must.

While expanding companies should adjust their structure, to maintain necessary level of agility on the one hand, but enforcing reasonable control and risks management on the other. There are several options for local companies to grow, or for multinational company to enter the Baltic Region.

The options how to expand and to operate in a new market are presented in table 3.2

Table 3.2

The options of how multinational company may expand and operate in a new market developed by author, validated by experts focus group

№	Corporate structure/unit from legal point of view	Definition
1	2	3
1	Branch (Permanent establishment)	A branch is an organizationally independent part of an undertaking, which is territorially or otherwise separated from the principle undertaking and at the location of which commercial activities are systematically performed in the name of the merchant. (Latvian Commercial law. [accessed 08 January 2022]. Similar definitions are present in all EU corporate/commercial laws
2	Societas Europaea (SE)	Operating Company with a European dimension, free from the obstacles arising from the disparity and the limited territorial application of national company law. (Council Regulation (EC) (2001). No 2157/2001. <i>Official Journal of the European Communities</i> , L 294/1)
3	Merger	Merger is: - the operation whereby one or more companies are wound up without going into liquidation and transfer to another all their assets and liabilities in exchange for the issue to the shareholders of the company or companies being acquired of shares in the acquiring company and a cash payment; Or -formation of a new company' shall mean the operation whereby several companies are wound up without going into liquidation and transfer to a company that they set up all their assets and liabilities in exchange for the issue to their share holders of shares in the new company and a cash payment. (Directive 2011/35/EU of the European Parliament and of the Council of 5 April 2011 29.4.2011EN Official Journal of the European Union L110/1)

Table 3.2 Continued

1	2	3
3	Subsidiary company	<p>Acquisition of the existing construction company. An acquisition is when one company purchases most or all of another company's shares to gain control of that company. (<i>What Is an Acquisition? Definition, Meaning, Types, and Examples (2022)</i> [online] [accessed 08 January 2022]). Deliberate transfer of control and ownership of a business organized in one or more corporations. (Coates, 2014)</p> <hr/> <p>Establishing a new legal entity. Compulsory information to be provided in the statutes or instruments of incorporation The statutes or the instrument of incorporation of a company shall always give at least the following information:</p> <ul style="list-style-type: none"> (a) the type and name of the company; (b) the objects of the company; (c) where the company has no authorized capital, the amount of the subscribed capital; (d) where the company has an authorized capital, the amount thereof and also the amount of the capital subscribed at the time the company is incorporated or is authorized to commence business, and at the time of any change in the authorized capital, without prejudice to Article 14(e); (e) in so far as they are not legally determined, the rules governing the number of, and the procedure for, appointing members of the bodies responsible for representing the company vis-à-vis third parties, administration, management, supervision or control of the company and the allocation of powers among those bodies; (f) the duration of the company, except where this is indefinite. (Directive (EU) 2017/21132 of the European Parliament and of the Council of 14 June 2017 30.6.2017 Official Journal of the European Union L169/46)

Generally, there are two ways of managing the expansion from corporate risks point of view:

- full liability of the mother company (branch, representative office),
- establishing subsidiary company under local commercial law.

There is no transfer of liabilities from a subsidiary (daughter) company to a mother company from legal point of view. Here, the term legal is important, since often the decision to “save” a daughter company (if problems appear) may be reasoned by other aspects, such as reputational or relationship with financial institutions. For details see Appendices 12 and 13.

There are pros and cons for each of the options mentioned above. In case a company decides to operate through a subsidiary, it can do so either by opening a new entity or by

purchasing an existing one. Opening a new legal entity is the less risky way of entering the new country, since, in case of failure, a mother company will suffer minimal losses and shall be most protected. On the other hand, new entity has neither resources nor references that will lead to a deeper involvement of the mother company at the initial phase of operations. Purchasing an existing company has a lot of positive aspects: staff, resources, equipment, certain references etc. are already in place. However, especially in case of purchasing mid or big size company, a very complicated process of due diligence is required, and even if it has presented sufficient level of transparency, it does not protect a new owner from unexpected claims or problems from the past. Branch/ permanent establishment/SE are very convenient from marketing and reference point of view, but they expose a mother company to a greater risk in case something goes wrong. The structure of the multinational company and summary of main legal pros and cons for choosing the legal form enterprise when entering a new market is presented in the Appendix 13. Generally, the structure of these subsidiaries will be similar to the structure of a local large/mid-size company. For the purposes of this work corporate agility of such an entity shall be explored, focusing on its daily operations and internal interaction, paying a special attention to coordination and control tools the management may or should implement.

According to the literary sources (de Witt, Oberlander, Nunnally, Flemming, Kragh etc.) and the results of the interviews, the following reasons force to multiply offices by region of operation preventing the use of one big office located in the state of origin:

- High regulation of the industry – all responsible engineers and construction companies have to be licensed and/or certified, since the construction normative acts are localized;
- The essence of construction requires daily presence of significant work force of both: a management team and blue collars on the building site;
- Linguistic barrier;
- The local bureaucracy should be maintained according to the local norms and regulations;
- Broad interaction with state and municipal institutions;
- Bookkeeping and taxes – have to be maintained according to the local norms;
- Legal field – laws and normative acts;

- Promotion – country manager often is motivated not only by promoting corporate goals, but also by implementation of his/her personal ambitions of being fully or at least partly independent officer;
- Purchasing and logistics – usually most of the materials are purchased in the local markets with all needed certificates and declarations.

The decision by the multinational construction company on its expansion into new market and its legal structure should be made considering the current situation in the particular market and that of the company in general, its expansion goals, running projects and tenders, and risks assessment. There is no one correct way how the company should proceed, but a comprehensive analysis and discussion have to take place.

One may conclude from the reasoning and the preceding analysis that multinational company should obtain similar structure and functions in each market or even region it operates. Meaning that branch/representative office/subsidiary of the multinational company shall face the same obstacles as any local company of a similar size, while their structures and functions shall not principally vary from one another. To summarise, it appeared that construction company has at least fourteen vital functions which it must maintain for successful operations. These functions can be combined in different departments, but all of them must be present.

For the purpose of this work author shall not focus on the predicaments of the relationship between the headquarter and its local or regional operational units, as the discussion of synergy, (over) control, reporting and extensive involvement of the headquarters representatives in daily operations of local branch of international a company shall not be part of this research.

3.2. Support and Primary Activities of a Construction Company

There are many academic research and theoretical papers dealing with the company correct structure and functioning. However, one of the most important contributions is Michael Porter' "Value Chain Model". According to Kessler (Kessler, 2013) Porter's value chain framework is widely employed by firms to identify their activities, analyse the linkages and strategic fit among these activities, and examine the cost-reducing and/or value-enhancing

potential of each strategic activity. Thus, the factors identified in the previous chapter could be classified according to the M. Porter's value chain model.

According to the M. Porter's (Porter, 1985) Value chain model, **each enterprise has primary and support activities.** Porter & Millar (Porter & Millar, 1985) found that **primary activities are those involved in the physical creation of the product, while support activities provide the inputs and infrastructure that allow the primary activities to take place.**

The concept of corporate agility of the construction company presumes deep cross-departmental cooperation, ability of rapid transformation/reorganization, and free knowledge and personal exchange. Therefore, author suggests reviewing activities in a balance, when no activity has explicit preference, since all of them are highly interconnected and have direct mutual influence. However, many components of corporate agility are related to support activities that serve as a basis for cross-departmental ties, therefore those will be discussed first.

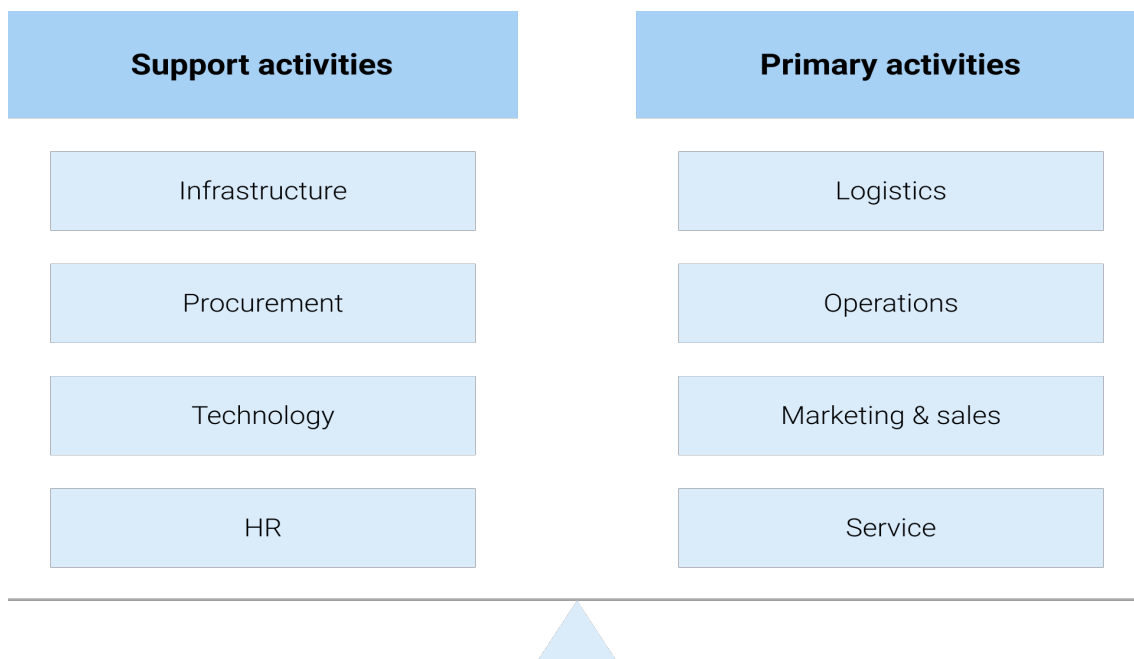


Figure 3.2 The balance of the corporate activities of the construction company adapted from M. Porter, 1985.

If the definition of corporate agility, given by the author in the chapter one of this research, is used then, for the research purposes, we have to group construction company functions in primary and secondary activities and analyse, how this could be employed to ensure corporate agility.

Primary activities vary from industry to industry, there is no one comprehensive formula how to make them “agile”. It does not mean that they cannot or should not be agile. On the contrary, it is the prime task of the company to protect its core business by making it less sensitive to the unexpected changes and dynamic influence from both internal and/or external domain.

The construction is a large project field. As a result it is a “big money” industry. However, it does not mean that construction companies cannot be agile. They certainly can be. It just requires strategic view and tactical planning.

According to Porter (Porter, 1987) the value chain defines the two types of interrelationships that may create synergy. The first is a company’s ability to transfer skills or expertise among similar value chains. The second is the ability to share activities.

Whelan & Fink (Whelan & Fink, 2016) found that sustainable businesses are redefining the corporate ecosystem by designing models that create value for all stakeholders, including employees, shareholders, supply chains, civil society, and the planet.

The abovementioned activities are important, but not the only elements of successful corporate performance. Corporate agility and performance are affected by many other factors. Author has compared factors affect corporate agility (please see chapter 3.6 for details) Impact of factors affecting corporate agility on support and primary activities of the construction company are presented in tables 3.3 and 3.4.

Table 3.3

Impact of factors affecting corporate agility on support and primary activities of the construction company, developed by author

№	Factors that affect corporate agility	Support activities affected by a factor	Primary activities affected by a factor
1	Poor structure (hierarchy, bureaucracy, procedures, past experience)	☑	☑
2	Human Resources (broad thinking, motivation, skilled workforce)	☑	☑
3	Poor management	☑	☑
4	Poor planning (including use of technologies and analytics)	☑	☑
5	Communication (internal, external, reputation)	☑	☑
6	Lack of strategy/vision	☑	☑
7	Financial	☑	☑
8	Influence of PESTEL factors	☑	☑

Essentially, as one can see from the information collected in the table 3.3. factors, affecting corporate agility, influence both support and primary activities.

Table 3.4

Impact of construction company's functions on support and primary activities of the construction company, developed by author

No	Functions to be obtained by construction companies	Support activities affected by a function	Primary activities affected by a function
1	Strategic and overall management	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Preparation and submission of tender documentation	<input checked="" type="checkbox"/>	Marketing & Sales
3	Cost estimation	<input checked="" type="checkbox"/>	Marketing & Sales Operations
4	Legal	Infrastructure	<input checked="" type="checkbox"/>
5	Financial, including bookkeeping	Infrastructure	<input checked="" type="checkbox"/>
6	PR and communication	<input checked="" type="checkbox"/>	Marketing & Sales
7	Quality management and assurance	Infrastructure	<input checked="" type="checkbox"/>
8	Administrative (IT, office maintenance and infrastructure)	Infrastructure	<input checked="" type="checkbox"/>
9	Health and safety	<input checked="" type="checkbox"/>	Operations
10	Procurement (purchasing)	Procurement	<input checked="" type="checkbox"/>
11	Engineering support	<input checked="" type="checkbox"/>	Operations
12	Construction projects implementation, including design and maintenance	<input checked="" type="checkbox"/>	Operations, Logistics, Service
13	Human resources	HR management	<input checked="" type="checkbox"/>
14	Equipment and material stock maintenance	Procurement	<input checked="" type="checkbox"/>

It may be concluded there is a substantial difference in how support and primary activities are influenced by functions of the construction company and the factors affecting its corporate agility. It is clear that factors affecting corporate agility of the construction company influence each activity of the organization, they create cross-departmental ties and links, forcing different departments to cooperate and proceed toward common goal. While functions can be easily attributed to a specific activity, sometimes the impact is reciprocal, where a stronger and a weaker activity is affected. One of the biggest challenges construction companies face is the lack of cross-departmental cooperation and lack of alignment between personal and corporate goals.

In the next chapter support and primary activities of a construction company through the prism of corporate agility will be reviewed and the factors affecting corporate agility of a construction company identified.

3.3. Agility in support activities of a Construction Company

The support activities have a significant impact on the performance of an enterprise.

M. Porter defined these activities as activities supporting the *primary* activities of the company. Support activities provide the inputs and infrastructure that allow the primary activities to take place. The categories are company infrastructure, human resource management, technology development, and procurement (Porter, 1987).

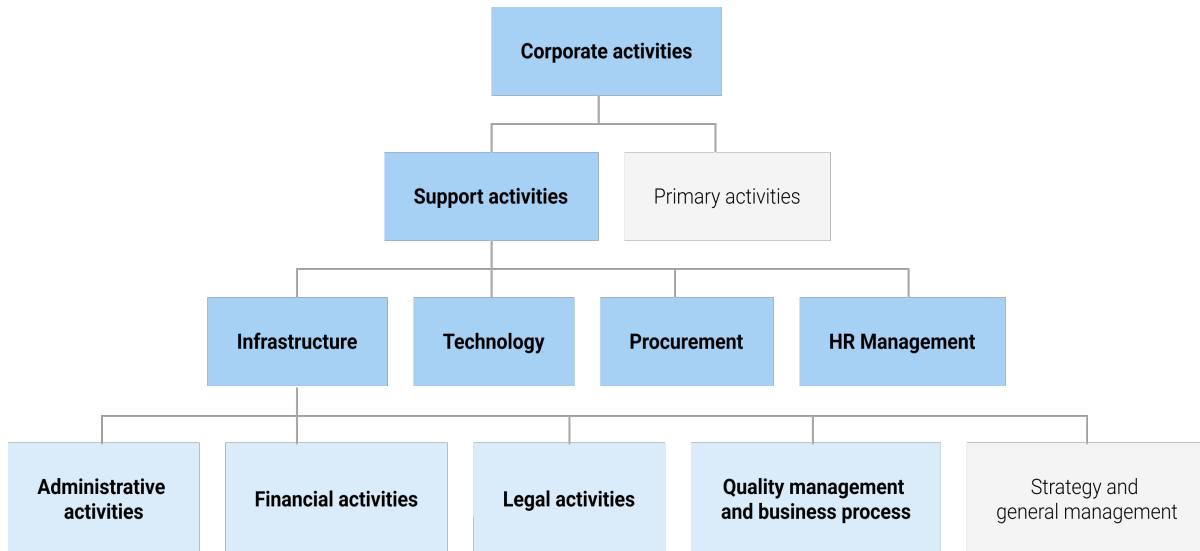


Figure 3.3 The scheme of Support activities adapted from M. Porter, 1985.

Quality of support activities depends on personal involvement, broad thinking, and dedication of the personnel, these factors have direct correlation with the motivation, feeling of importance for the work contribution and the appreciation from the management and colleagues. Unsatisfied or demotivated employee will never support the organization and will never try to implement agile or creative approach for the problem solving. Lawyers, bookkeepers, accountants, financial analysts, technical and IT staff, HR managers, procurement specialists of the organizations, where their activities are not the core to the business, often feel like robots needed for some background routine operations, or as third class passengers of a high-speed train driven by primary activities leaders. Thus, ambitious specialists often do not apply for such company' jobs positions. It is one of the most important tasks of the respective top manager (CFO, CTO, CIO, CLO or even CEO) to replace this employee perception with the feeling of belonging and necessity in their roles. The notions of both: self-development and overall company goals should be explained and incorporated. If personnel identify themselves with goals and needs of the company, if they understand that

by working towards the corporate goals their personal aims could be achieved as well, the success is unavoidable.

Agility in infrastructure of a Construction Company

According to M. Porter (Porter, 1985) “**firm infrastructure**” consists of a number of activities such as **general management, strategic planning, finance**, including accounting, **legal, quality management** and other **administrative activities** that support the entire chain. The general management and strategic planning shall be discussed in later chapters, while governmental affairs are an integral part of all support activities due to the involvement (regulations, taxes, tenders, orders, etc) of the state in the industry.

Having explicitly supportive role, legal and accounting/financial departments are generally considered the least flexible among all corporate operations, even by non-managerial staff.

According to Martin (Martin, 2017), there is much frustration with certain corporate functions like HR or Legal department. The question “Doesn’t legal understand that we are going to lose this deal if they don’t sign off soon?” became a daily routine. Nowadays executives “feel that they have little influence over (legal services), what they spend and what they get for it—and that the accountability seems to be much less than what most other business services provide” (Ertel & Gordon, 2012).

Legal department

Ritz (Ritz, 1994) states that fifty years ago, contracts were often signed, filed, and forgotten until project completion. Not so today! Lawyers have turned construction into one of their more lucrative business opportunities. Langford & Male (Langford & Male, 2001) found that contractual arrangements make up the final component locking the market mechanisms procurement and tendering strategies into place. Contractual arrangements provide the legal framework set up to formalize the relationship between the client, the client’s advisers and the contractor. Due to a contract’s legal nature it is important that the project team understands the legal implications of their actions relative to project contracts (Gannet Flemming, 2009).

The accountability and understanding of the final objective (contract signing, letter writing, etc.) are the key words. Lawyers should be part of the business processes in order to understand that the main purpose of their services is not limited to perpetual disclaimers or

to putting a halt on processes due to dangers posed by a particular deal/clause (certainly due diligence need to be performed). They also should be able to come up with the solution(s), whilst understanding a balance between the imaginary “0” risk deal and realistic business aims. Risks in business will never be nulled, but those should remain reasonable. According to Nunnally (Nunnally, 2007) construction professionals must have a thorough understanding of the customary practices and underlying legal principles involving contract construction. Virtually every action taken by a contractor, construction manager, or architect/engineer at a construction site has legal implications. There is simply not time to consult a lawyer every time a decision must be made. Thus, construction professionals must understand the contractual consequences of their activities and be able to recognize when legal advice should be sought.

Legal counsel has to advise the decision maker, bearing in mind that aiming for the “perfect contract” may kill a “good deal”. There are two groups of employees that legal department works closely with – the office staff (top management, financial department, tender department, etc.) and the construction projects’ teams. The cooperation with the “office departments” generally runs much smoother than cooperation with the project teams. One of the reasons could be that office staff, including legal department usually are working from the main office and interact with each other on the daily basis. At the same time, a project team is located somewhere outside the office and does not have the same level of interaction with the office staff. Furthermore, project team often consider office bureaucracy as an unnecessary burden, and office employees as money spenders, while projects they are working on to be the only activity that brings money for the company. Such arrogant approach often leads to the conflicts even from initial the phase of signing the contract.

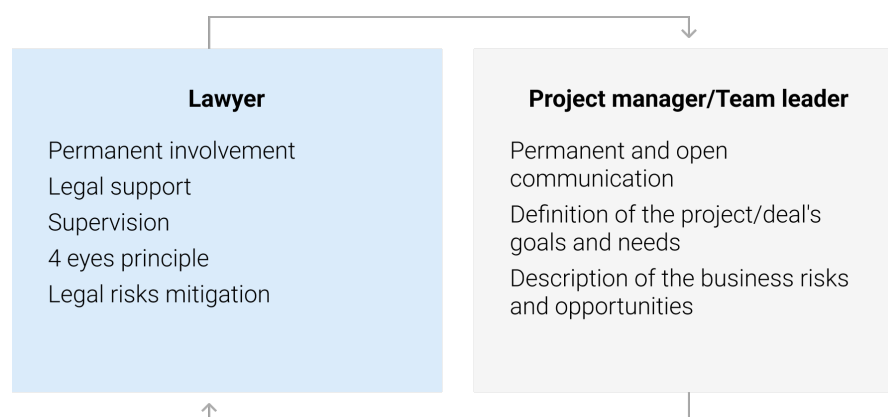


Figure 3.4 The communication chart between lawyer and project manager/team leader developed by Author.

An important step in involving legal department employees in other processes is to introduce the project to them, defining the goals, describing the general path and outlining the risks, while skipping the technical details. If a lawyer bears in mind that common intention is to sign the contract, he/she should raise all risks for internal discussion, reducing the redundant and excess prudence, and outline the real and important disputable issues.

Stevens (Stevens, 2007) suggests finding lawyers that work with contractor exclusively, they will not have to learn about your business on an hourly basis and they should know the other side attorney's habits and personality well. They will aid you to shape the strategy whether to proceed with litigation or to settle.

The lawyer should be always informed about alternative plans, importance, and exclusiveness of particular supplier/client. If there are four other suppliers with approximately same price and capacities, you may play tough trying to get better conditions negotiating the contract. On the other hand, if the consequences of not signing the contract are losing money, due to the lack of alternatives, the legal advisor should be aware of that, finding the most creative and flexible solutions to protect the company while it is possessing the "underdog" position. One of the options to reduce time and minimize efforts negotiating the contracts is to use standard contract, FIDIC for instance. However, Nunnally (Nunnally, 2007) claims that even if the contractor is familiar with the standard contract forms being used, care must be taken to fully evaluate all special conditions as well as the plans and specifications.

Oberlender (Oberlender, 2000) insists that open and honest communications are necessary to instil integrity and support for each other. Trust is essential to effective and successful teams.

Such communication between the project team and lawyer having minimal interference from the next level managers should both exclude unnecessary bureaucracy and to speed the work up. However, it does not mean that the process should not be supervised. Despite or even due to the flat structure each employee involved should have an option to get a consultation from the more experience professional or supervising manager. The reports done by the team should be sent to the project's legal advisor to keep him feel part of the team and to have '4 eyes principle' while external (not full-time team member) advisor may have fresh insight with valuable remarks. Of course, keeping the processes and decisions within the laws and contractual obligations is the task that will always serve as a basis for any other action or negotiations.

Bookkeeping and financial department

Stevens (Stevens,2007) found that majority of contractors don't enjoy functions like accounting, financial management, administration and tax reporting. However, it is certainly a necessary evil to continue to be in the construction industry.

Infamous Enron and Arthur Andersen are the first names to pop up when talking about financial "thinking out of the box" and "flexible" accounting. However, agility is not about fraud. It is about adaptation and cancelling unnecessary bureaucracy.

One of the main aims of a well-functioning financial department is to get acquainted with and evaluate the true financial and economic position of a companies, their operational efficiency, to evaluate and control the construction and production processes by identifying, controlling and improving their quality (Fedotova, 2019). Cohen & Serafeim (Cohen & Serafeim, 2020) found that transparency and accountability go hand in hand. To date, the absence of effective impact measurement has obscured the accountability of companies for the harm they cause. Rewriting accounting rules to include impact will alter investors' assessment of corporate performance, leading them away from negative-impact companies to positive-impact ones, and catalysing a change in corporate behaviour. Bookkeepers and accountants are very focused and systematic people by the essence of the profession. None can manage the huge data of numbers and operate with big amounts of money in and out day by day without any work frame and rules to follow.

It is highly important to implement control and monitoring systems over the projects. According to Shadan, et al. (Shadan, et al., 2012) construction company that relies only on accounting information to manage project costs and does not create a project cost control system finds that cost data appropriate for accounting controls is not helpful from a project cost management point of view. On the other hand, this control should not become a burden.

According to Langford & Male (Langford & Male, 2001) there are many construction firms centralized financial matters and accounting to establish stronger control and promote the cost savings. Similarly, as in case with legal department there are two groups of colleagues the financial department are cooperating with – the office (top management, legal department, tender department and etc.) and the construction projects. The second office rarely requires any exceptional or urgent issues to resolve. Routine management reports, payments, organizing documentation, tax, and authorities' issues these are daily duties financial account is responsible for. On the other hand, the construction project is alive and

less organized place that often plans in general and make quick adjustments according to the new developments on the construction site. All this makes financial team nervous and unsatisfied, while construction team sees them as a fifth column. Ritz (Ritz, 1994) found that although the accounting departments handle the mechanics of preparing and paying the project invoices, the project manager is responsible for reviewing and approving them for submission and payment. Their reviews should ensure that the invoices conform to the terms of the contract. Thus, payment approval should require only a routine arithmetical check by the accountant. However, even this department can turn to be “agile”. The first step to make them understand that organization is not running for the sake of reports and balance sheets. It runs for the corporate goals. In terms of bookkeeping the primary task of keeping financial flows and transactions – transparent, controllable, and according to the laws and standards remains in front.

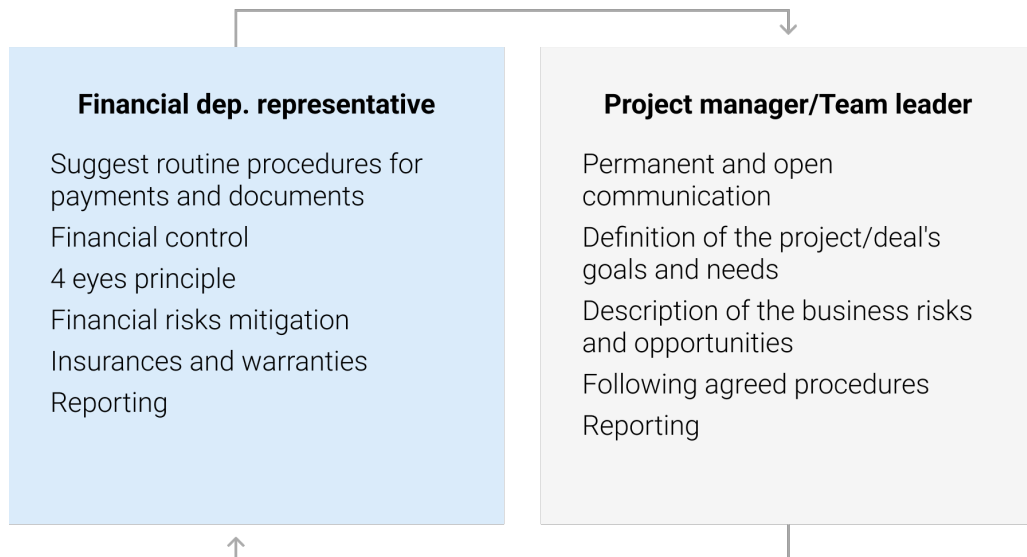


Figure 3.5 The communication scheme between financial dep. representative and project manager/team leader developed by Author.

However, it should be accompanied by personal involvement. The situation of being in a distant shelter far away from the “battlefield” makes financial staff feel that nothing depends on them, that they bear no responsibility and are either above the project they serve or playing a kind of outsourced consultant role. It should not work that way. Accounting is a blood system of any company. This system should ensure oxygen’s supply (financial resources) to the organs (projects/teams/departments) assisting them to operate and to develop. The guideline for the financial and technical teams’ cooperation should be that “the financial

management of a construction company is equally as important to company success as is its technical management” (Nunnally, 2007).

Certainly, bookkeepers cannot be directly involved in negotiations and close deals, like lawyers are. Kragh et al. (Kragh et al., 2018) found that financial follow-up is one of the most important tasks of the project manager. In most cases, the project manager is required to report on the financial position of the project once a month, and the company will form an estimate of his ability to document company finances, which ultimately may have influence on his own payment (payment by results). It is therefore important to build a system with the purpose of recording actual production costs and compare these costs with the calculated costs.

There should be one representative from the financial department responsible for a direct communication with the Project Manager. By so doing, on the one hand, unnecessary filters are avoided, the whole picture is provided, feeling of mutual cooperation enhance the productivity, and both daily and overall needs of the projects are clarified.

Administrative activities

There are many small but important functions that shape the daily operation of the construction company. Secretary, IT, archive, office drivers/curriers, office maintenance, top managements assistants etc. have a significant impact on the effectiveness and productivity of the construction organization. Today IT is one of the most important functions that a company maintains. Emails, computers, servers, conference platforms and much more has become an integral daily routine. All supportive functions supplement the overall synergy and integrity the organization wants to achieve and to maintain. The meaning of the corporate agility, thinking outside the box and always being prepared for quick reorganization or having a plan “B” is a must for a secretary, same as for any other employee. These administrative supportive activities should be thoughtfully described within the quality management processes and documents.

Quality management and business processes

These two main sub activities play an important role in the daily routine of any construction company. Quality assurance and quality control create basics for the further development of cross-departmental cooperation resulting in a corporate agility, when 4 eyes principles of internal supervision assist to reach common corporate and private goals. On the hand, the business processes create a nervous system and blood vascular system at once. It

provide the guidelines for cooperation, operation and decision-making processes, and creates a channels and rules for communication and information exchange.

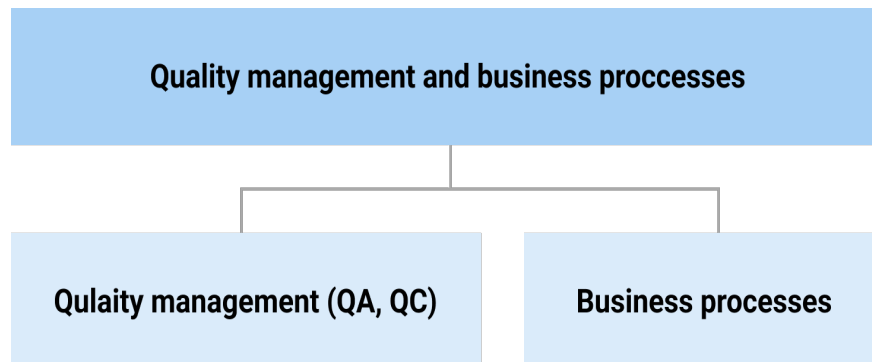


Figure 3.6 The sub functions of the Quality management and business processes activities of the construction company developed by author based on Porter, 1985.

Quality management: quality assurance and quality control

Quality management is integral part of the company's infrastructure. Nunnally (Nunnally, 2007) found that more recently, the terms quality management (QM) and quality assurance (QA) have been adopted to include all aspects of producing and accepting a construction project which meets all required quality standards. Quality management includes such activities as specification development, process control, product acceptance, laboratory and technician certification, training, and communication. Quality control (QC), which is a part of the quality management process, is primarily concerned with the process control function. Since the contractor has the greatest control over the construction process, it has been found that quality control is most effective when performed by the contractor.

Geipele et al. (Geipele et al., 2019) posits that conformity or nonconformity of the product to the previously set agreements, guidelines, normative acts, and regulations should be assured and checked in a construction industry.

This means that quality and construction managers should be guided, in the first place, by laws and normative acts, and only then by the contractual obligations. All construction process participants should understand that high quality demands lead to the high price of construction, which is not always justified at the final use.

Quality managers are rarely adored persons in any organization; however their work is highly important for a smooth and well organized operations. There are two main tasks the quality managers are in charge of in the construction entity. First, they have to assure quality at the construction site from documentation point of view. Second, quality managers also

have to create internal and external processes, inventing and maintaining minimally necessary bureaucracy, so employees could operate according to their responsibilities and job descriptions.

Nunnally (Nunnally, 2007) uses the terms quality management (QM) and quality assurance (QA), adopted to include all aspects of producing and accepting a construction project, which meets all required quality standards. Quality management includes such activities as specification development, process control, product acceptance, laboratory and technician certification, training, and communication. The responsible certified specialists should ensure that works are done and materials used are according to the design and regulations. Despite that, and due to the fact that most of the site staff are goal-oriented persons, they usually focus on the process and not on the documentation, deeming the latter as unimportant. Subrahmanyam & Jalona (Subrahmanyam & Jalona, 2020) found that construction industry is not well known for leveraging data effectively, nor for using cutting-edge analytics to make informed decisions.

There are specially delegated people that deal with documentation, as it is needed for the delivery of the works and completion of the project. It may be a small group within the project team for the large-scale projects, or some young trainee or technical secretary for the small one. Nevertheless, the project team is responsible for whole project including documentation, they should be supervised and checked during the whole construction process, since the cost of improperly used material may lead to huge financial expenses to repair and delay in the time schedule. (Gannet Flemming, 2009., Kragh et al., 2018; De Witt, 2005).

The second task of the quality managers within a construction company has a **direct and heavy impact on the corporate agility, and it is a creation, and a management of the company's business processes.**

Business processes

According to Bruno et al. (Bruno et al., 2011) Business Process Management is called agile when it is able to react quickly and adequately to internal and external events. Agile Business Process Management requires putting the lifecycle of business processes on a new paradigm.

Business processes are the nerves of any organization. No company can exist without the processes. Most of them are cross-functional and guide both individuals and whole

departments how to cooperate and to interact in order to fulfil tasks and achieve the previously set goals, signalling violation.

Gottanka & Meyer (Gottanka & Meyer, 2012) classify business processes into two categories:

- well-defined and often repetitive processes;
- loosely structured processes (knowledge-intensive).

The balance and the limits between these two kinds of processes are determined by several following factors:

- the primary activities (industry) of the company (the repetitive processes prevail in manufacturing companies, while knowledge-intensive at the organizations working with human capital and art);
- the size of the company (the smaller company shall have more loosely structured processes)
- the region company operates in (there are less bureaucratic and more bureaucratic cultures);
- level of competition (less competitive environment shall enhance repetitive processes and behaviour);
- Macro economical and legal environment (stable external environment shall enhance repetitive processes)

Setting and describing processes in both primary and/or support activities the management should maintain basic principle of minimally necessary bureaucracy.

DeWitt et al. (DeWitt et al., 2005) found that quality control and quality management plans are developed primarily by the contractor. Kragh et al. (Kragh et al., 2018) suggest that company should have a well-developed quality assurance system to be used irrespective of the chosen contract form. Its staff members responsible for quality assurance should be all trained in the routines and use of forms drafted by the company.

In order to fulfil their duties and deliver successful results acting in the field of creation of the processes, quality managers, like other firm's infrastructure departments, should have extensive knowledge of the **factors that shape corporate agility** and have general understanding of each project's issues they supervise. According to Langford & Male (Langford & Male, 2001) demanding and discerning clients are increasingly looking for high quality of

service from largely technical project management teams. The success of the project and the quality of the overall service depends on how these individuals and groups interact.

The frequency of the procedures review should be specified in their manual. However, it should be continuously updated. Author recommends that quality control and management system's procedures should be fully reviewed once in three years and to be inspected in different departments once a year. Kondalkar (Kondalkar, 2007) assumes that such approach will sensitize individuals who are directly or indirectly involved in organizational processes. In such organizational systems individual display their voluntary commitment to develop organizational processes and assist each other to resolve issues irrespective of their departmental boundary.

Corporate agility is neither about a mess, nor about a chaos and an anarchy. Corporate agility is about minimization of the bureaucracy and adapting both procedures and employees' behaviour to achieve the corporate goals in the most effective way.

As was shown above the processes and quality management are continuously maintained processes where control, adjustment and improvement never end. However, the business processes creation, management and maintenance are a corner stone of any attempt of turning a construction company to be agile. Simple and clear procedures, which are developed and periodically reviewed together with employees, and not dictated from top, simultaneously motivate personnel, and facilitate their routine work life. This, in turn, allows employees to act quickly and energetically in crisis times. This emotional involvement and deep understanding of the essence of the procedures and processes creates a unique feeling of belongingness and trust between employee and organization.

Agility in Procurement of a Construction Company

Procurement in the construction industry consists of two sub functions:

- purchasing, when company procures something by itself;
- participation in tenders, where a company goes under procurement procedure of a client;

The latter, participation in tenders, will be reviewed in the chapter of Primary activities, under activity of Marketing and Sales.

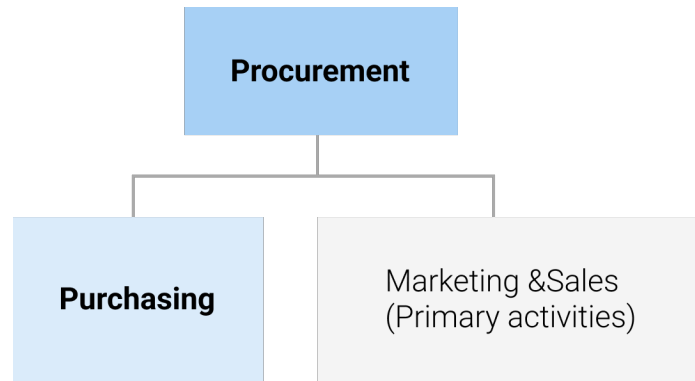


Figure 3.8. The sub functions of the Procurement activity of the construction company developed by author based on Porter, 1985.

Procurement support both the entire chain and its elements, playing an important role and managing significant resources. Unfortunately, procurement specialists are often perceived as servants or waiters that have to bring orders that were placed. Benheim and Birchall (Benheim and Birchall, 1999) consider new procurement methods as a tool to integrate the construction supply chain, because it provides openness, trust, cooperation, harmony of decisions, sharing of benefits, intangible and long term investment, collective working routine, and a fair allocation of risk.

According to M. Eatough (Eatough, 2014), procurement teams are often disconnected from the functions they serve and the markets they engage. Too often, they are not fluent in the nuances of the business and therefore lack the expertise and authority to challenge or influence spending decisions. This often frustrates sales and the revenue-generating front lines, further isolating procurement.

Lawyers or financiers are usually well-educated and enjoy prestige status, while procurement specialists do not.

Another reason, why procurement is pushed aside, lays in the internal corporate competition and ambitions. Van Hoek (Van Hoek, 2013) claims that only about a third of managers are bringing any supplier intelligence into their organizations by advocating for suppliers and facilitating new connections for them, which is what you would expect someone managing the supply chain to do. Just 20% claim to be communicating business insights shared by those customers; only 17% could even tell us in what segment their supplier put their company.

Procurement should be acquainted and identify themselves with both the general corporate and specific project needs. It has a substantial bearing on any mid-size or big

company's resources if a procurement of the office daily needs (coffee, stationery etc) is done effectively and in a centralized way. However, in order to avoid becoming detached the supervision is very important. On the one hand, the procedure should be followed (number of participants in each procurement, timely process launch, bargaining etc), but purchase of pen cannot be the same as a purchase of the crane. Thus, procurement should have a differentiation based on: the sum of the purchase, the way it is done, the internal client, number of involved and supervising persons.

Often small routine purchases are delivered by the suppliers from the previously approved list, while the prices are renewed once in a reasonable period (6-12 months).

Green et al. (Green et al., 2004) concludes, that within the context of integrated procurement approaches in construction, the conditions of mutual dependency will prevail across integrated supply chains. The special or individual procurement should have a detailed task/description from the team/project that places the order. The representative(s) of the team should take part in the negotiations and final decision making. Such symbiosis should lead to the best price for the correct product. However, in order to achieve these agile aims procurement team/nominated specialist should understand the overall project needs and to get familiar with the details of the particular product/service. He/she should be treated as equal team member, and not as foreign element that has to be ejected. Identification with the team's goals, understanding of the teams need and feeling of belonging will hit two targets at once: to get what is needed for the best price and will bring additional input of supervising from outside to overlook the team performance.

Agility in Human Resource management of a Construction Company

Eaton (Eaton, 2008) found that HR Management is that function concerned with people rather than finished products or services. It considers individuals, teams, groups, sites and the whole organization as possible levels of inter-action. It also concerns the inter-relationships of the individual and the organization and their contributions to personal development. Author performed literature overview and found that HR is integrated in and affect all main corporate elements. The following table represents the areas where HR play a significant role in the construction industry.

Table 3.5

The HR related areas within the construction company developed by Author

#	HR related area	Source of reference ³
1	2	3
1	Organizational structure and behaviour	Maassen,2002, Kondalkar, 2007, Weber 1948, Adizes 2014; McGregor 1960; Eaton 2008; Ritz, 1994, Mayo 1933; Brooks & Spillane, 2016; Lidelöw & Simu, 2015, Gelfand et al 2006.
2	Employees compensation packages and support	Hitt, 2016, Hamouda, 2020, Snyman&Smallwood, 2017, Robles et al 2014, Mollo et al 2020, Maslow, 1943, Nunnally, 2007, Oberlender, 2000, Gelfand et al 2006, Ilveskoski and Niittymäki, 2015, Huzooree & Ramdoo,2015, Gothelf, 2017, Cappelli and Tavis, 2018.
3	Administration and Employments records	Isik et all, 2010, Salleh et al 2016, Eaton 2008; Ritz, 1994, Huzooree & Ramdoo,2015, McGregor 1960, Oberlender, 2000, Vrijhoef 2011, Dan-Asabe& Radosavljevic, 2009, Kähkönen & Sexton 2005, Cappelli and Tavis 2018.
4	Communication with external and internal stakeholders	Huzooree & Ramdoo,2015, Vrijhoef 2011, Burnes, 2017, Duckworth, 2016, Cardoso et al 2015; Gorse, 2003; Brockman, 2012, Gothelf, 2017 Lundberg & Lidelöw 2015; Ng 2004, Van Dijkhuizen et al 2021, Wibowoa & Waluyo, 2015, Hofstede, 2011, Friberg & Eldring ,2013; Eldring et al, 2012;
5	Development and training of the employees	Hofstede, 2011, Maslow, 1943, Burnes, 2017, Friberg & Eldring (2013); Eldring et al 2012; Duckworth, 2016, Ilveskoski and Niittymäki, 2015, Kähkönen & Sexton 2005, Gothelf, 2017.

The human resources' (HR) managers operate in the field where rigid rules and instructions usually have a negative impact. The relationship between employer and employee has been always complicated. According to Huzooree & Ramdoo (Huzooree & Ramdoo, 2015) companies are craving for the HR that may respond on the one hand quickly, proactively and flexibly, while following the corporate strategy on the other. Figure 3.9 illustrates how HRM interacts with all spheres and activities of the construction company.

³ For the full details of authors and publications

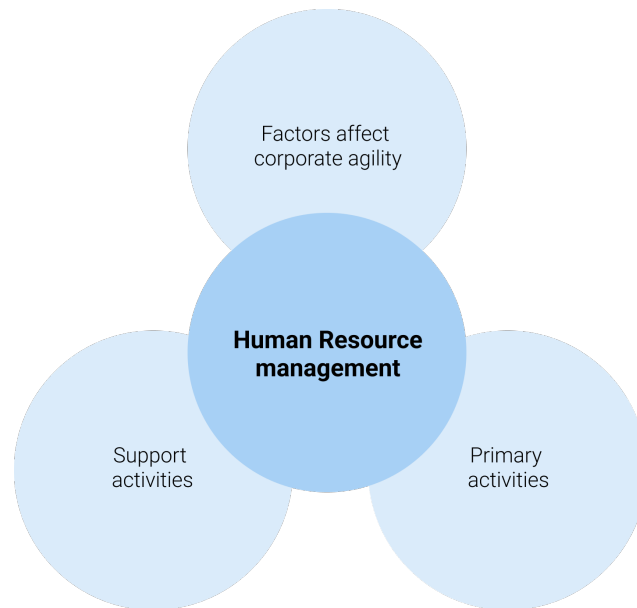


Figure 3.9 Human Resources interaction with Corporate activities and the corporate agility affecting factors developed by Author

HR even more than other support activities depend on the industry and prime activities of the company. Nerur et al. (Nerur et al., 2005) proved that traditional HR management approach focuses on personnel functions such as planning, recruitment and selection, socialization, performance appraisals, some employee-centric development initiatives such as training and development interventions, and motivation initiatives.

While, in an agile organization, HR needs to provide the same services, but in ways that are responsive to the ongoing changes in the culture and work style of the organization (Gothelf, 2017)

The agility of HR is mainly oriented towards internal clients from the primary activities' departments. HR should not be limited to the manpower function. It should work in close cooperation with the PMs and management to ensure that suitable candidates takes the position that corresponds with his/her personal skills and interests, which should be dedicated to improving and shaping corporate performance and corporate agility. It ensures correct communication and compensation programs. HR should assist in identifying one's personal goals with the goals of his/her business unit and with general corporate goals, stimulate employee to think laterally, to be involved and to succeed. According to Christensen et al. (Christensen et al., 2007) designing an organizational structure may mean that rationality is somewhat reduced at the organizational level compared with the individual level. There is a

room for possible conflicts of interest between individual members and their organization as well.

The motivation and the development of the employees are the most important tasks of HR department. There is a variety of options how to motivate people. However, the most important stimulus is an alignment between employee's personal goals and those of organization. The HR should guide (according to each department/ project needs) wise and correct use of these unique drivers turning them into the dynamic and productive teamwork, healthy corporate social environment, and organizational and business success.

Communication methods the HR should implement and lead within the organization are very important as well. Identification and understanding of the internal bureaucracy should prevent the overloading of tests and balance score cards. Conversely, the open communication and feedback from the (Cappelli & Tavis, 2018). People should understand they their voice has been heard and they were listened to. However, HR ought ensure that the communication **should not** turn the organization into a never-ending pipe of criticism or create a feeling that management shall accept each and every request and suggestion.

Compensation the employee receives should correspond to the level accepted on the market and the industry. According to Cappelli & Tavis (Cappelli & Tavis, 2018) compensation works best as a motivator when it comes as soon as possible after the desired behaviour. Annual merit-based raises are less effective, because too much time goes by. It works not only for the financial bonuses. The professional promotion to the desired position, increase in level of responsibility and/or delegation, better workplace, etc could be as good incentive as a salary growth. There is a vast number of cases when externally oriented promotion, "elevating" person above the "crowd" motivated people better than any personal benefits. HR should recognize the internal personal motivation drivers and should assist direct managers to implement the most suitable ones.

To summarise, agile HR is the proactive response to the potential needs of corporate internal Clients for the ambitious, honest and nimble professionals. The human and individual oriented HR policies and programs should never contradict with the corporate values and strategy. HR (as not a primary activity) should always support the organization in its development, but never become the essence of the corporate daily routine.

Agility in technology of a construction company

There are two kinds of technology in construction. The technology of the construction processes and performance of the actual works on site. This is very important part of the daily

operation, and its deep understanding/ lack of knowledge has a direct effect on the quality, economics, and time schedule of each building project, and shall be reviewed as part of the primary activities. The second type of the technology is the technology inventing or developing building materials or equipment. The latter usually is not a part of business of the construction companies, as defined for the purposes of this research, but is being done by universities or niche players of the construction market that have a very narrow specialization. Thus, the latter will not be reviewed within this paper.

3.4. Agility in primary activities of a construction company

Primary activities create a product or a service, deliver and market it, and provide after-sale support. The categories of primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and service M. Porter (Porter, 1987).

The main or primary functions (called production) include all fields of construction the company is active in (civil construction, infrastructure, marine, road, etc.) and divisions responsible for the heavy machinery and necessary manufacturing. The marketing/sales is less valued by companies that concentrate on the state projects, while it is of high importance to companies that work with private clients. Since the final product of the construction usually is immovable property, there is no need for the logistics related to the product distribution, but it plays an important role ensuring delivery of the materials and equipment to support the building process itself.

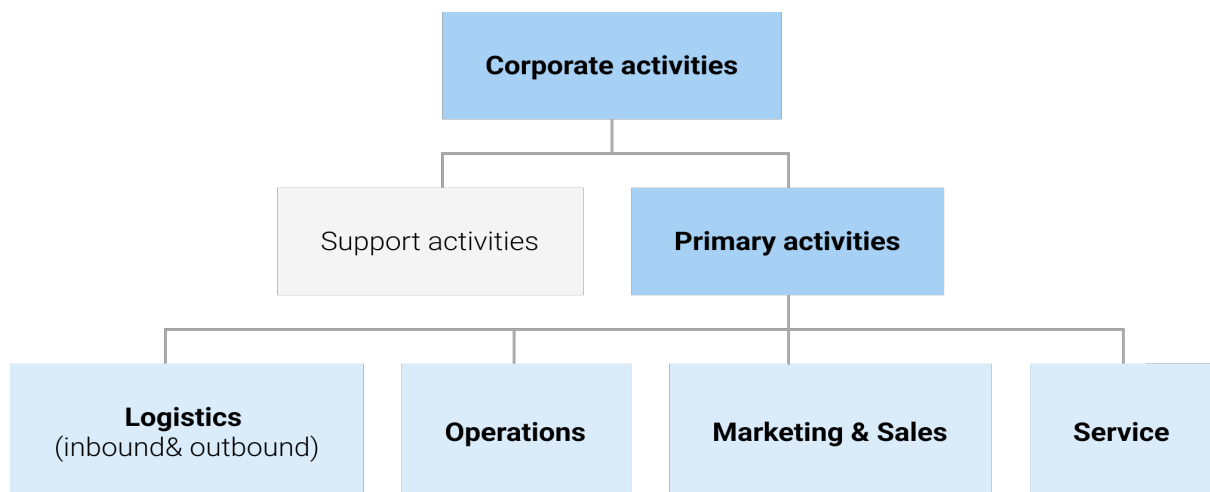


Figure 3.10 Primary activities of the construction company adapted from Porter, 1985.

Agility in Operations of a Construction Company

Construction is an industry of high risk and responsibility. Each mistake may lead to dramatic consequences, while on the other hand a job well done may serve from tens to millions of people every day for decades. Operational component is one of the most important activities and it requires the lion's share out of financial, human and technological resources of the company. It also has the heaviest impact on the performance of the organization, since it is the source that generates cash flow and revenues for the corporate existence, while other departments, does not matter how important they are, only "spend" money. Operation in construction means realization of the project. It can be pure construction, when design is provided by customer, it can be "design & build" project, or BOT (Build – Operate- Transfer), where contractor is responsible for design, construction, operation and maintenance of the project. Of course, the level of responsibilities dramatically differs from project to project.

Operations shall be split in to two following subchapters: "technology and knowledge development" and "implementation".

Agility in technology and knowledge development

As was stated above, this work will not include the analysis of technology in terms of development of new materials since it is out of daily scope (of activity) of the construction companies. Usually, this kind of technological research and development is done by universities, labs, often in cooperation with material producers.

Hereinafter, terms technology and knowledge shall be used as synonyms. The development of technology for a particular construction process or processes is considered as part of overall knowledge that should be shared and contribute to the project's completion on the most efficient way.

According to Porter & Millar (Porter & Millar, 1985), every value activity of the firm embodies technology, be it knowledge, procedures, or technology built in the process equipment. Contrary to the view that technology development takes place in the engineering department or the R&D group, in practice it occurs in many parts of the organization, and it has many forms, from basic research and product design to media research, process equipment design, and servicing procedures.

In the wake of Information Revolution, the value-chain theory argued that the source of firm's competitive advantage is embedded in rapidly developing information technology

(Porter and Millar, 1985). A more recent knowledge-based view of the organization states that the source of firm's competitive advantage lies in its knowledge-based assets (Meroño-Cerdan, et al., 2007) and its absorptive capacity (Doloreux, et al., 2015), a firm's capability to identify, assimilate, and exploit knowledge from the environment (Huggins & Weir, 2012). Accordingly, technology development processes, which traditionally were tied to technical aspects of new product development are currently being considered processes that integrate information flows and bases of knowledge created within and externally to the boundaries of the firm (Pérez-Bustamante, 1999). The centre piece of agile technology development is the focus on shorter development phases and radical collaboration with the client in each phase (Mergel, 2016). Therefore, technology development and knowledge management are tightly linked.

Having studied forty-four US design firms, Meyer & Marion (Meyer & Marion, 2016) identified the following elements that characterize agile technology development process:

1. **Rapid prototyping.** This approach follows the motto: "fail fast, early, and often" with small prototypes that rapidly prove or disprove an idea before much is invested;
2. **Fluidity.** The main idea is to keep the design of a new product, service, or process as fluid as possible as the design proceeds through development, not to overdesign too early in the process;
3. **User-involvement.** Company or team review each prototype iteration with prospective users, thus increasing the success of innovation commercialization rate;
4. **Coupling internal resources with external subcontractors,** which allows advancing projects forward at high speed and being first to the market;
5. **Own developed innovation framework.** These frameworks tend to have "fuzzy phases" with recommended practices within each phase, rather than defined stages and gates. They are largely considered guideposts for teams, not rigid checklists.
6. **Team self-governance and strong discipline.** Design firms show that balancing flexibility and discipline nurtures deeper innovation.

The development of the correct and efficient technology for the implementation of the project through the usage of previously obtained knowledge plays a key role in the success or fail of each particular project. It was found that all phases brought above require quick and precise exchange of information and sharing knowledge. Thus, all these elements support, complement and interact one with another forming continuous process of agile operation.

The analysis of most successful design firms shows that knowledge management, in the form of continuous learning, knowledge exchange and building of communities of practices, is a high-value vehicle for agile technology development (Meyer & Marion 2016).

According to Dove (Dove, 1999), in the agile organization knowledge management is responsible for having the right knowledge in the right place at the right time. It means that organizational knowledge portfolio is built to anticipate emerging needs, satisfy current needs and weed out obsolete needs – everywhere in the organization. To have the knowledge at the right time means that it is available sufficiently in advance of when it must be utilized to allow for the application time. In other words, knowledge management is about learning, knowledge diffusion and purpose.

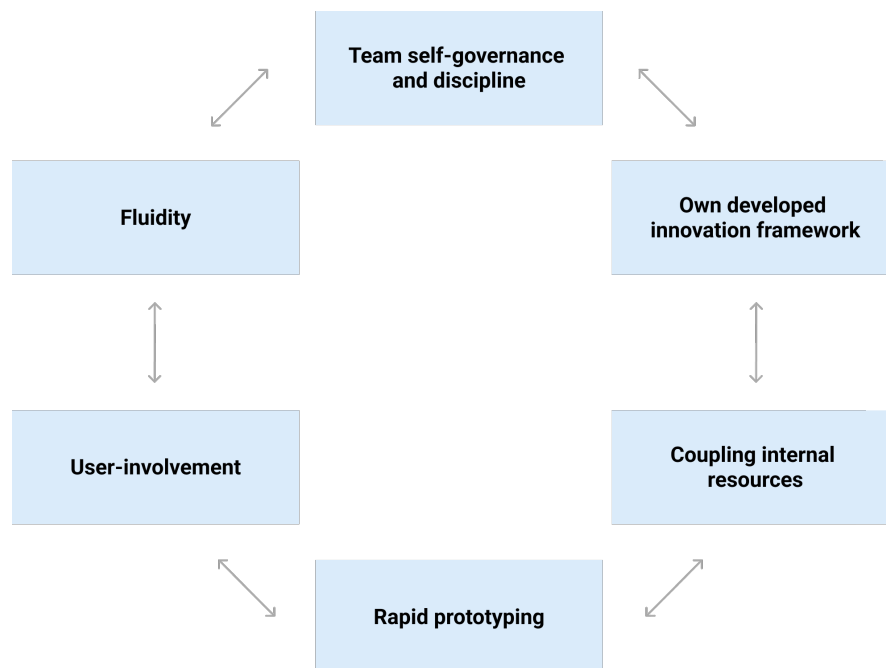


Figure 3.11 Continuous mutual interaction of agile technology forming elements according to Meyer & Marion, 2016.

All stages of implementation of the construction project shall be reviewed later, but it is important to notice that transfer and sharing of knowledge is crucial for the success of any construction project.

Organizational learning is connected with the development of so called dynamic capabilities, “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Eisenhardt & Martin, 2000). In the view of Zollo & Winter (Zollo & Winter, 2002), the three mechanisms focal to the

organizational learning are experience accumulation, knowledge articulation and knowledge codification. The purpose of knowledge diffusion is to pack a piece of knowledge so that it can be quickly and effectively transferred from one person to another within an organization. It involves the development of common vocabulary and communication structure, common culture and a knowledge transfer mechanism. Finally, the purpose of knowledge management is to support a firm's strategic plan. It has to span appropriate time period and serve as the sole guiding source document for the person or group charged with strategic management of the knowledge portfolio(Dove, 1999).

As was discussed in the previous chapters, the minimal level of bureaucracy and cross-department team involvement in the implementation of the projects ensure the data and knowledge sharing. Commitment of the team to the common goal of successful completion of the project forces team members to cooperate in finishing the task.

The knowledge in construction industry is obtained from various sources. The primary source of knowledge is professional education institution. All qualified workers, architects or engineers have to study somewhere. If, in case of on-site workers, we are talking about relatively short-term education, primarily for technological-specific nuances of the profession, then designers and foremen study many years to receive a strong academic background to ensure safety and efficiency of buildings and structures. Despite this, the environment, in which young post-graduate specialist starts to work, has a huge influence on him or her. Often academic studies provide a basic knowledge and only set guidelines for the rest. Yesterday student learns plenty from his surrounding and more experience colleagues, when he/she begins his professional life.

It is critical that neither technological nor organizational knowledge (apart from sensitive and business data/know-how) is hidden and kept for a limited number of people, but spread and shared to relevant addressees. Sharing data does not mean that there is a diffusion of responsibility for any specific task, and a mystical collective spirit will solve all problem from now on.

The hierarchy and responsibilities remain as they were, but everybody in the team should contribute within his/her capabilities. Indeed, it should be practices within reason. There is no sense to overload a lawyer with the question of phasing of the works, at the same time a lawyer should be aware if works of a particular subcontractor are the bottleneck for

the whole project. Being aware of that lawyer may implement contractual tools that would motivate subcontractor to fulfil his obligations.

The habit of sharing information and reasonable involvement of the team in implementation of the project allows not only to face external challenges, but also to minimize damage in case of team members leave. The knowledge and technology are integral parts of implementation of any project.

Implementation

DeWitt et al (DeWitt et al., 2005), found that Evolving industry roles and the adoption of alternative project delivery methods are creating changes in the conventional construction management practices that public agencies use to ensure appropriate project delivery, contract compliance, and quality assurance.

The construction process is intrinsically dual. On the one hand, it is very strict or “static” from the phasing point of view, a roof cannot be built before a foundation is laid. The “critical path” of a construction project is essentially dictated by laws of physics, structural mechanics and engineering calculations. On the other hand, a large number of people involved, numerous tasks, performed simultaneously, and continuous data input that flows up until the final completion day, turn the construction into one of the most dynamic processes in world. Consequently, all process members balance between rigid technical and legal requirements, adjusting routine and plans on the daily basis due to the ever-changing environment, to achieve constructability.

According to Yitmen and Akyel (Yitmen and Akyel, 2005) -constructability can be defined as the optimum use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives.

At the same time, Nunnally (Nunnally, 2007), proved that poor construction management practices often result in one or more of the following: *project delays that increase labour and equipment cost and the cost of borrowed funds, High material costs caused by poor purchasing procedures, inefficient handling, and/or loss, Increased subcontractor cost and poor contractor-subcontractor relations, high insurance costs resulting from material and equipment loss or damage or a poor safety record, low profit margin or a loss on construction volume.*

In order to understand how technology development could be turned into an agile process, the lifecycle of the project should be illustrated. According to Jardine (Jardine, 2007) matrix of the building process has the following phases - please see fig 3.11.

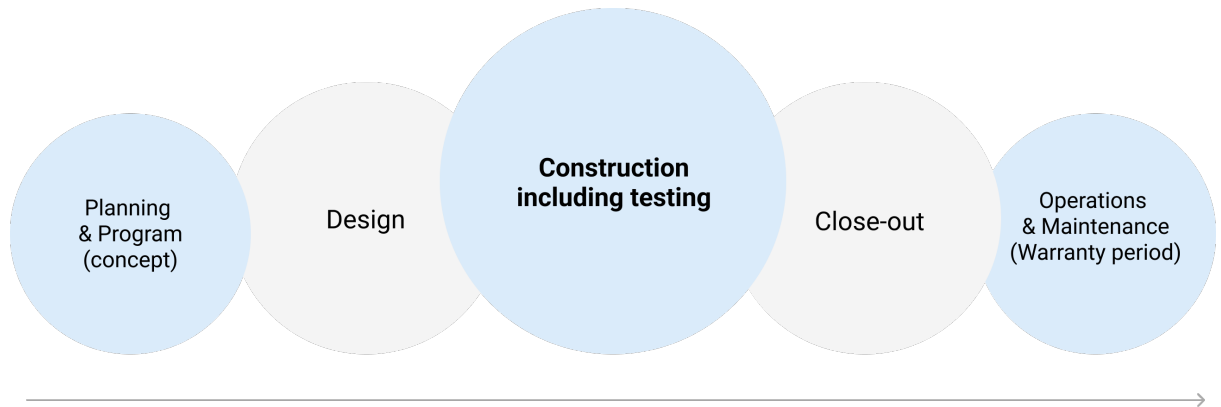


Figure 3.12 Phases of the building project, adapted from Jardine, 2007.

Author has used studies of Meyer & Marion (Meyer & Marion,2016) and Jardine (Jardine, 2007) to describe phasing of a building project from the corporate agility point of view. Each phase was split into six agility forming elements, a description of necessary activities that form particular agility element is provided in Appendix 14. The findings are summarized in table 3.6.

Table 3.6

Importance of agility forming elements during the phases of the building project – created by author. The detailed description of activities can be found in Appendix 14

#	Agility forming element	Phasing					Source of references for the description of the activities
		Concept	Design	Construction	Close-out	Warranty	
1	Coupling internal resources with external subcontractors	☑☑	☑☑☑	☑☑☑	☑	☑	Barbosa et al 2017; Eldring et al. 2012; Ilveskoski and Niittymäki 2015; Oberlender (2000); McGregor 1960; Kang et al 2006; Motzko et al 2013; De Weerd et al (2020); Pal & Panteleo 2005; Kang et al 2006; Yitmen and Akyel, 2005; Böde et al 2020 Shadan, et al 2012 ; Nunnally 2007; Adler et al 1999; Fewings & Henjewe (2019); Tuutti 2005; Ritz (1994); Eaton 2008; Mintzberg et al (2006); Kähkönen & Sexton 2005; DeWitt et al (2005); Eldring et al. 2012; Guo et al 2010; Gannet Flemming 2009; Khalfan et al, 2005; Kragh et al 2018 Parsons, T.(1951); Weber(1946); Brockmann and Girmscheid, 2010; Sheridan, T. and Kendall, N. (1992). Langford & Male (2001); Stevens 2007; Siew 2014;
2	Team self-governance and strong discipline	☑☑	☑☑☑	☑☑☑	☑☑☑	☑	
3	Fluidity	☑☑☑	☑☑☑	☑☑	☑	☑	
4	Own developed innovation framework	☑☑☑	☑☑☑	☑☑☑	☑	☑	
5	User-involvement	☑☑	☑☑☑	☑☑	☑☑☑	☑☑☑	
6	Rapid prototyping	☑☑☑	☑☑☑	☑☑	☑	☑	

The construction industry continues to develop and according to Verdenhofs et al. (Verdenhofs et al., 2019) its technological advancement has led to tremendous increase of data. The technological progress, data and knowledge accumulation has a direct impact on the technological process. As it was mentioned in the previous chapters the technology of the construction processes is essential for both maintaining the time schedule and the budget of the particular project and for the overall successful operation of the whole entity. Chan & Kumaraswamy (Chan & Kumaraswamy, 1997) asked clients, consultants, and contractors to identify the main factors causing project delay. Although agreeing on the major causes the clients and consultants blamed the contractors to have a lack of experience in planning and site monitoring, and the contractors blamed the consultants (architects/engineers) to have a lack of design experience. This mutual blame shifting is typical for any construction process.

The importance of the planning and control through usage of modern technologies should not be overlooked. The technological process is intended specifically for the testing and examining the assumptions of the architect and engineers, to model the project effectively allocating resources. Here the use of supporting, but advanced software allows all stakeholders (owners, approving institutions, architect, engineers, contractors, etc.) to visualize, estimate and prepare the construction organization project, whilst complicated and challenging solutions are being identified and promptly discovered. Today software solutions and programs take digitalization to the next step. The programs allow to minimize human error. Construction management integrate the design drawings, taking out the volumes for the cost estimation, and link budget to the schedule and cashflow. The reports automatically present the ongoing situation of the whole project by pushing only one button. However, it is important to remember that these are just tools, that minimize risks of mistake during the data transfer or cross check, but it does not replace the data input and planning inserted by the author of a particular process.

Summarizing this chapter, author would like to draw attention to a high importance of cross departmental cooperation in implementing the construction project. The transfer of knowledge between the departments or within the project team and thoughtful planning are the keys to the success or failure of the project. For instance, having a planning and construction organization engineer(s) assisting the project manager (especially for the large-scale complicated projects) would create a system where a project manager and a site manager may source an overall information and to force them to have a bird's-eye view,

breaking the daily routine of micro tasks. Such a professional can be nominated either from the technical department that support an ongoing project or, as an alternative, it may be developed by the project team on site. It is important to remember that most of the financial losses are related to the usage of the wrong approach, not following technological requirements, poor preparation, ineffective team, lack of planning and/or control. All these can be improved implementing agile approach of management of the construction company.

Agility in Inbound and Outbound Logistics of a Construction Company

The logistics in the construction industry plays an important role, however it focuses on the logistics of the materials, labour force and mechanisms from and to the construction site. The final product of the construction process will remain in place.

According to Christopher (Christopher, 1992) logistics and material management led to the development of the supply chain concepts. However, Briscoe & Dainty (Briscoe & Dainty, 2005) identified a lack of a comprehensive approach to the building supply chain, including clients, developers, designers, engineers, contractors, specialists and suppliers.

The concept of supply chain integration has been described by several researchers (Cagliano et al., 2006; Campbell & Sankaran 2005; Vrijhoef, 2011;) as a development path towards lower levels of fragmentation and higher levels of repetition in the supply chain. For the building supply chain, this would imply the establishment of a more stable production environment, for instance by a multi-project approach, and installing integrated process formats replacing the existing disintegrated and one-off production strategies.

Vrijhoef & Koskela (Vrijhoef & Koskela, 2000) found the following kinds of supply chains:

- **a converging supply chain** directing all materials to the construction site where the object is assembled from incoming materials. The “construction factory” is set up around the single product, in contrast to manufacturing systems where multiple products pass through the factory, and are distributed to many customers.
- **a temporary supply chain** producing one-off construction projects through repeated reconfiguration of project organizations. As a result, the construction supply chain is typified by instability, fragmentation, and especially by the separation between the design and the construction of the built object.

- **a typical make-to-order supply chain**, with every project creating a new product or prototype. There is little repetition, again with minor exceptions. The process can be very similar, however, for projects of a particular kind.

As was concluded by numerous studies, lack of agility harms the logistics and supply chain management as well. The aspiration to make the whole construction process as flexible as possible led initially to the lean construction, that according to Ballard (Ballard., 2000) emphasized production control and planning, e.g. collaborative planning with subcontractors and suppliers, through systems such as the last planner system. Naim et al (Naim et al.,1999) suggested developing building supply chains following an 'agile' paradigm, i.e. using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile market.

In order to improve the supply chain of the construction company all its elements and affecting factors should be analysed and maximally integrated. The elements to be improved undergoing the integration process of the supply chain have a direct effect on the factors that affect the corporate agility as shown in table 3.7

Table 3.7

Factors of analysis for supply chain integration (adopted from Vrijhoef, 2011, and author's research)

Factors of analysis for supply chain integration		
Factor	Description	Corresponding factors affecting the corporate agility*
1	2	3
Integration of business activities	The focal firm has integrated business activities internally, and additionally it controls external business activities as well.	Poor structure Lack of strategy/vision, Poor planning
Partner sourcing and collaboration strategies	The focal firm has established strategic agreements and long-term collaborative arrangements with key partners in the supply chain.	Lack of strategy/vision, Poor planning Financial
Integration of operations and processes	Firms in the supply chain have connected or integrated the governance of processes and operations to achieve flow, and increase the effectiveness and efficiency of the integrated delivery process	Poor structure Poor planning Communication
Quality management	Firms in the supply chain apply total quality management to processes across corporate boundaries.	Poor structure Communication Poor planning
Information exchange	Firms in the supply chain share information and knowledge in a joint information system.	Communication
Product development and design	Firms in the supply chain develop and design products jointly and rationally applying product and production modularization.	Lack of strategy/vision, Poor planning

Table 3.7 Continued

1	2	3
Market approach and marketing	Firms in the supply chain are engaged in collaborative market approaches with the aim of delivering integrated products to the end market effectively and efficiently.	Lack of strategy/vision, Financial Influence of PESTEL factors
Cultural alignment	Firms in the supply chain have aligned their respective business cultures to increase commitment and channel behaviour supporting and serving the supply chain as it were a "single firm"	Communication Influence of PESTEL factors
Human resource management	Firms in the supply chain have implemented a joint approach to their personnel, including joint staffing and training, fostering integrated working and stability of the workforce throughout the supply chain.	Human resources Poor structure

*corporate agility affecting factors are described in chapter 3.6.

In conclusion, it is worth to point out that in a global world where materials to the construction site are delivered from multiple and sometimes distant places, where the unique site conditions or special technological solutions force a supply chain to go beyond the simple definition of logistics. It includes cooperation of many stakeholders and detailed planning, forces development of strategy, promotes cross-departmental cooperation, improves human resources management and communication. The supply chain management in construction plays one of the key roles in any project implementation and requires a great teamwork. Nevertheless, it is split as a separate activity, and, as it was demonstrated, it has a great impact on both daily and long-term operation of the construction company. Supply chain management integration in the concept of corporate agility should be reviewed as part of the operation activity, since it is integral to and inseparable from the latter.

Agility in Service of a Construction Company

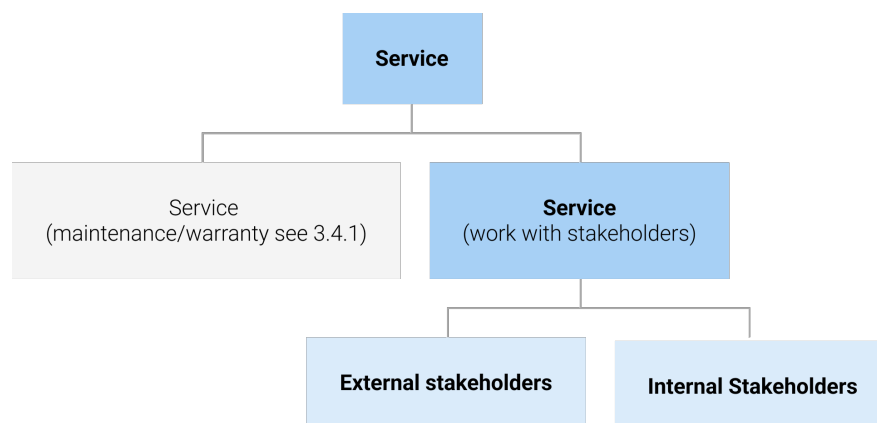


Figure 3.13 Service – work with construction company's stakeholders adapted from Porter, 1985.

There are two meanings for the term “Service” in the construction industry. The first is a “Postconstruction period service” also called “Warranty period” and it was described previously.

Another meaning of this term is “How it should serve its customers, stakeholders and subcontractors?”. Here the term “Service” will be discussed in terms of way of thinking, self-positioning and communication of between the company and its staff.

Khalfan et al (Khalfan et al., 2005) found that the requirements and needs of the clients, specific to a project and overall from the construction activities, include: reduction in cost; improvements in profits; expenditure is kept within the budget limits; achievement of sustainable outcomes; predictability of construction program, price, and quality; faster delivery than the competitors; development of a safe environment; etc. In practice, the abovementioned **client’s wants are the aims and objectives** (and if not, then should become the aims and objectives) **for all the participants involved** in a construction project supply chain. According to Bourne and Walker (Bourne and Walker, 2005). **The success of construction project is linked to the strength of the stakeholders’ relationships that** can be created by effective, regular, planned and ad hoc communication with all groups of stakeholders .

According to Gibson (Gibson, 2000) there are two groups of the stakeholders in the construction industry:

-internal - representing the internal exchange, can be defined as those who are formally connected with the project (e.g. owners, customers and employees);

-external - representing the external exchange, are those affected by the project in some way.

There is a permanent “stakeholders turnover” when one body or institution can be internal and external stakeholder simultaneously for the same company. For instance, municipality may play a role of external stakeholder, being an institution that approves design or formally put a building into operation for the ongoing private project, and at the same it may procure a municipal building (school, kindergarten, library and etc.) and become a Customer and internal stakeholder for the same contractor. Considering the abovementioned, the stakeholders of the construction company in terms of a particular project should be analysed.

Leung & Olomolaiye (Leung & Olomolaiye, 2010) suggested the following illustration to describe interconnections of the stakeholders of the project, please see fig. 3.14.

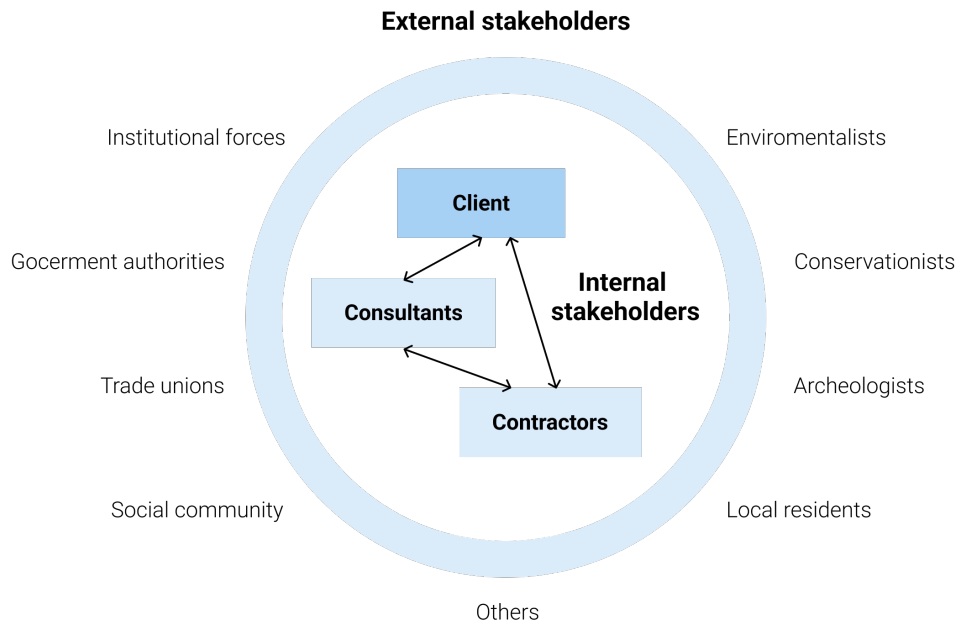


Figure 3.14 Interplay between some key stakeholders of the construction project, adapted from Leung and Olomolaiye, 2010.

The figure above shows the relationship within the construction project the internal circle of parties that are directly involved and implement the construction project, while the external circle shows the indirect influence of the third parties on the project. The internal circle relationship is money- based relationship, while the relationship with the external circle may have both financial or non-financial grounds. Stakeholder relationship in a construction company can be described by a Captain model.

A Captain model.

According to the Captain's model there are three behavioural models, or roles, a contractor implement depending on the financial relationship it has with particular stakeholder. A contractor adjusts its behaviour and communication depending on the role it plays :

Body/ies that pay/s money to the contractor, a **waiter's role**;

Bodies that being paid by the contractor, a **customer role**;

Bodies that do not have any (or have negligible) financial relationship with the contractor, a **neighbour role**.

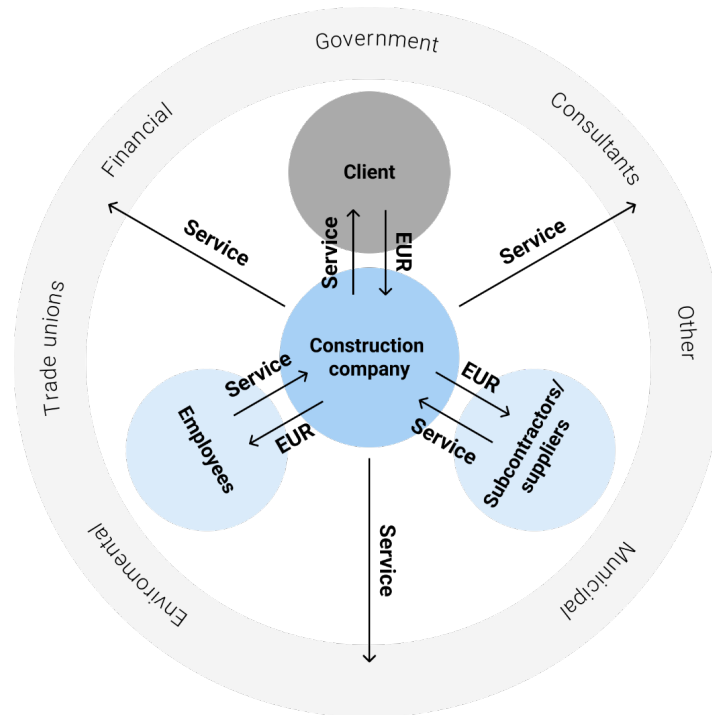


Figure 3.15 Captain's model – an interaction between contractor and stakeholders, including money and services flow developed by Author.

Based on these types of relationship a construction company may adopt different communication and service providing behavioural approaches. A model of relationship of the General Contractor with all stakeholders of the project, called a "A Captain model", was developed by Author (See fig. 3.15). Similar to a captain of an aircraft, who has to serve its customers (passengers) during the flight, he/she has a general goal of arriving to a destination point safely and on time. The captain of the aircraft enjoys the same safety level as any crew member or passenger, and all of them have their own reasons why they want to arrive to the same destination point. There are three basic assumptions for this model:

- A construction company should not suffer losses/ bankrupt;
- A construction company should lead and coordinate all processes (including those formally attributable to other parties), by servicing all the stakeholders;
- A construction company should maintain precise, legally accurate and polite communication.

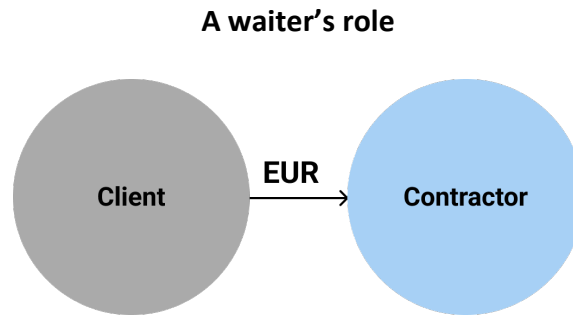


Figure 3.16 Interaction between contractor and paying authority (Client) developed by Author.

As any other services providing company- the construction company should treat its customers in best way possible. Each construction project results in significant investments from the client's side and he/she wants to get value for money. The main difference with the restaurant business is the level of risk. Having a bad meal, the client would lose some pocket change and one evening. The restaurant might lose one of its thousands or tens of thousands of clients. In construction the failure may result in bankruptcy, or a significant loss of funds and a few years. Signing the construction contract, both parties should recognize that it is a sort of partnership or a marriage for few years ahead. It possible to change a contractor in the middle of the building process, but it is extremely difficult and often results in costs increase and delays. That is why customer usually insists on the much more favourable contract conditions. Close cooperation with the customer or its representative creates a personal relationship that may turn out to be positive and friendly, as well as negative and hostile.

Khalfan et al. (Khalfan et al, 2005) found that Client often shows his/her faith, trust, leadership and awareness to positively and proactively exercised (Client's) authority in order to achieve the full benefits of the process.

The Customer will always have enough means to force contractor to fulfil his/her will. That is why contractor team starting from the top management should build trustful and friendly relationship with client. The service the client gets should be outstanding, precise, and transparent. There will be a lot of problems and disputes during the construction process, but contractor should always project calmness, optimism, and willingness to resolve difficulties objectively . The construction company usually is in the underdog position, thus it has to exercise flexibility and cooperativeness not only due to organizational culture, good client service and reputational reasons, but also due to the legal and financial (often

disproportionate) consequences that might be caused by unbalanced behaviour of the contractor.

Ling et al. (Ling et al.,2005) found that there are issues that were not rated in the same manner could be divided into two groups. In the first group, clients and consultants felt that the issues affected them, but main contractors, specialist contractors, subcontractors and suppliers (collectively known as contractors) felt that these issues affected them to a lesser extent. In the second group, contractors felt that the issues prevented them from achieving business improvements, but clients and consultants were affected to a lesser extent. These issues are as follows: client focuses on lowest price at tender stage; current standard conditions of contracts do not create positive working relationships on projects; and allowing too many companies to tender for any single job or project.

Fairness is the key word in the relationship with anybody. It is very difficult to dispute, when other party stick to fair and proved approach, including ability to recognize and acknowledge own mistakes. Such balanced attitude forces the other party to act accordingly and share its fears and problems. The contractor's team should always regard a long-term goal of successful completion of the project, and sometimes to give up along the way relatively minor issues to keep Customer satisfied. It is recommended to forecast part of the budget for such unexpected costs that may help avoid bigger problems. Nevertheless, this does not mean that a contractor should agree to each and every request of the client, it should protect its own interests, in the way that Client should think he paid less than what he has received.

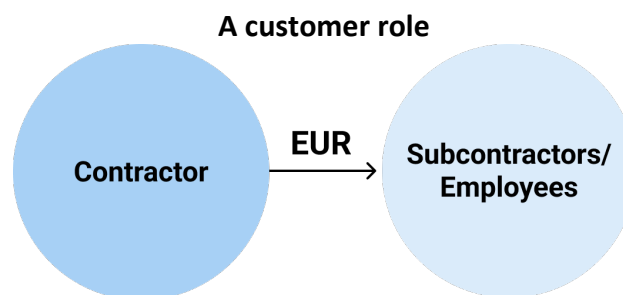


Figure 3.17 Interaction between a subcontractor/employee and a contractor (construction company) as a paying authority developed by Author

The relationship with the subcontractors (including suppliers and other service providers) and employees (for detailed analysis of relationship with employees see chapter 3.5) should be based on the same principle as the relationship with the client. The fairness, transparency, professional honesty, own interest protection. Additionally, in the relationship with the subcontractor, the general contractor has a dual role. It is a customer and should

receive a service and respective treatment from the subcontractor side. On the other hand, it is also service provider – it has to provide room or zone to work in, to coordinate different contractors among themselves, to provide the security and facilities and much more. However, the main difference is that the ratio of power or strength between the general contractor and subcontractor, usually is in favour of the general contractor. It is not an exception when general contractor is much bigger than its customer, while the situation where subcontractor would be close to the scale of the general contractor, rarely exists. The risks and impact also differ.

The general contractor should assist its suppliers and subcontractors for the following reasons:

- It almost never can transfer all risks it has towards the client to the subcontractor;
- Even if legally risks are transferred, often due to the weak financial stability of the subcontractor, it has nothing to back its responsibility up with;
- The ability of planning and resource availability of the subcontractor are much more limited than those of general contractor;
- The reputational risks for general contractor usually are higher than those of the subcontractor;

According to Oberhelman et al (Oberhelman et al., 2010) maintaining good subcontractor relationships is essential to the general contractors. In order to obtain the lowest cost for the client, they must receive all of the lowest qualified subcontractor bids on a project. It is general contractor's policy and responsibility to qualify subcontractors for their ability to adequately maintain the workforce and have the financial viability required to maintain a project's schedule. Consequently, the general contractor often softens his contractual requirements towards the subcontractor trying to get him on board with the best possible price. However, even with this knowledge the subcontractor will always be in position where it makes almost no sense to litigate with the general contractor. Such situation of overpowering control and dominating position should not be misused.

According to Elmualim (Elmualim, 2010) large construction firms in the UK are typically seen as hollowed-out organizations in that very few of them carry out the work themselves. Practically all their work is carried out by subcontractors or by subcontract labour.

The general contractors, especially ones who do not engage own workforce, should be especially careful with the subcontractors, since in case of arrogant and ungrounded

discrimination of the subcontractors, they might be left with no one. The subcontractors will not maintain loyalty and will refuse to work with them. Such situation may harm general contractor who might be already at the stage of tender, struggling to receive offers, or getting inadequate prices.

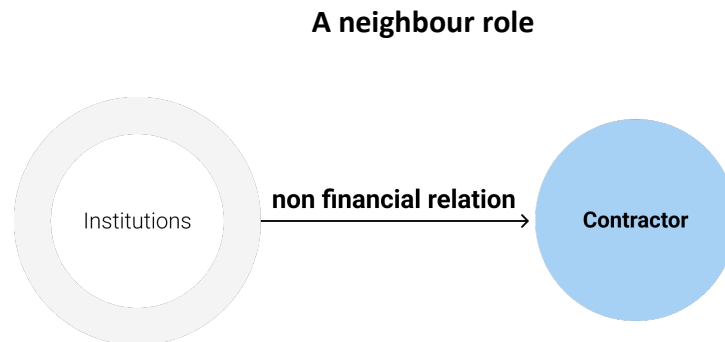


Figure 3.18 Interaction between contractor and institution that has no financial relationship with contractor developed by Author

An arrow in the model of neighbour still shows towards the contractor. This is done on purpose. Despite the fact, that both parties do not depend financially on each other, the contractor still “needs” this institution more than it “needs” him.

According to Leung & Olomolaiye (Leung & Olomolaiye, 2010) external parties that have no contractual relationship with the construction client and no authority over construction projects, but failure to recognize them or their concerns in the construction project may also create risks. As construction projects always involve permanent changes to the immediate environment, residents and other interest groups, such as green groups and archaeologists, will thus be very sensitive to a project. If their interests are infringed, they can create a surprisingly powerful opposition to a project. However, here a contractor should undertake the lead over the processes necessary to fulfil the requirements of the external stakeholders. This work should not be done for free, it should be either included in overall cost estimation or be charged separately instead. Having all the responsibilities in contractors’ hands may appear as an increased risk, but with correct legal formulations these risks can be reduced, yet the feeling of good service towards clients will remain. Another advantage the contractor enjoys is a better understanding of the respective process and an ability for better planning and pushing when necessary, having a direct contact with respective stakeholders.

As mentioned above, the relationship with the stakeholders is in a context of project. General contractor has an overall responsibility to design, to build and to deliver the project.

If the necessary approval from the city road department cannot be obtained, most likely it will have zero effect on the road department, which in case of violation may even penalize the construction company. At the same time, the lack of such approval may put the whole project under threat bearing heavy consequences for the construction company that may start with an idle of the site, and end up with breach of contract, penalties, and compensation of losses. Even in cases when a contractor behaves as “a neighbour” (see table 3.8) having no financial relationship with a particular body or authority, it should still be considered that only an agile approach of adapting to the requirements of the authority will lead to the needed positive result. Legal disputes and scandals, even when a contractor is right, rarely assist to the success of the project.

Table 3.8

Comparison of the contractor’s roles according to Captain’s model.

Description	A waiter	A customer	A neighbour
Money flow	To the contractor	From the contractor	Non-financial relationship
Service flow	From the contractor	From and to the contractor	From the contractor
Risks	According to the contract	According to the contract. Risk that employees mistake, or bad performance of a subcontractor will result in the unscalable loss in terms of the main contract with the client	Change their mind, new legislation, long decision-making process, inability to affect the process.
communication	Precise, legally accurate, polite	Precise, legally accurate, polite	Precise, legally accurate, polite

Summarizing this author would like to highlight that implementation of a Captain’s model means being a reliable Partner. Partner, that should position himself to resolving any problems that may arise. Assist, cooperate and perform proactively. The principles of fairness, transparency, honest treatment, interest protection, assistance, understanding, professional approach, compromise approach to issue resolution should become a DNA of any construction company, without distinguishing which hat it wears now. If company is guided by these principles, it will gain positive reputation and sustainable growth. The core principle of corporate agility of always having plan “B”, being prepared for the unexpected challenges, should never overwhelm fairness in business.

Agility in Marketing and Sales of a Construction Company

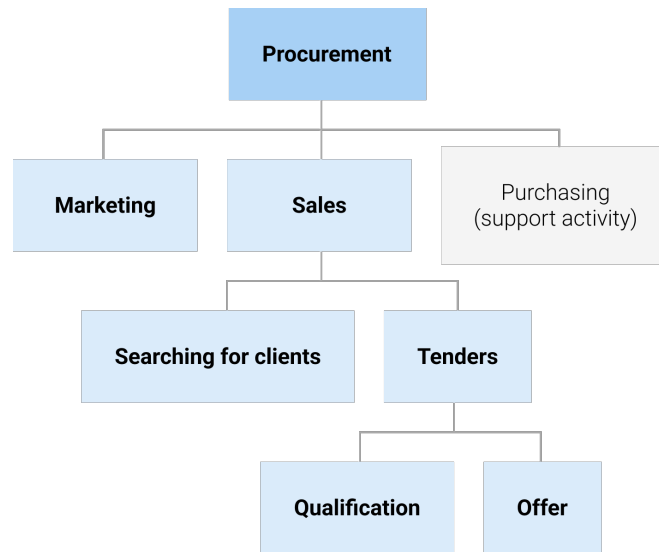


Figure 3.19 Procurement activities of the construction company adapted on Porter, 1985.

Marketing of the construction company is as important as for any other company. However, the marketing of the construction company, no matter how large and international it is, will differ from large and international companies from other industries.

Brand awareness and marketing activities despite the international status of a construction company will remain expressively local. Each product is unique, tailor made and belong to the customer.

According to Langford & Male (Langford & Male, 2001) marketing research for a construction contractor may gather information on:

- demand for certain types of projects; buildings or structure;
- categories of client, identifying specific needs and wants;
- identifying suitable target market segments;
- monitoring the marketing and promotional activities of competitors.

Thus, brand promotion/advertising activities will be more connected to the charity or sponsoring activities. Involvement in scientific projects and their support to gain both new product and promote the company within professional society. The construction company should create and maintain excellent brand awareness and clear reputation. Since it would be rare case when construction company would promote particular product. The significance of the state sector among the customers reduces the need of very aggressive marketing

campaigns. Since all procurement is done through depersonalized procedure and often through electronic platform, when brand awareness has zero effect.

Sales is one of the key functions in any organization. Turner (Turner, 1997) considers construction company's clients across five categories: property and development companies, investors, occupiers, local and central government authorities and quangos. Oberlender (Oberlender, 2000) suggests division into Public and Private clients. There are few differences between these two kinds of clients. However, the structure of the company should be able to answer the needs and challenges arise at both these markets: private and public.

According to many researchers (Ilveskoski and Niittymäki, 2015, Nunnally, 2007, Ritz 1994, Oberlender, 2000 etc.) and author's personal experience, there should be special team or department responsible for participation and preparation of the tender documentation for the tenders and its submission. Main tasks of such department would include: searching for the clients, preparation of documents for the technical, financial and legal qualification, preparation of the technical and/or financial offer

This division may be split even further, but it will not change the scope of functions. According to academic studies (Langford & Male, 2001; DeWitt et al., 2005; Barbosa et al 2017 etc) and author's personal experience there are following kinds of contracts: traditional - separating design from construction, management (contracting, project, construction etc), subcontract, Design & Build (may include financing), Develop and Construct (often with financing), Build, Operate and Transfer (BOT), Public and Private Partnership (PPP, Private Finance Initiative, essentially finance, design, build, operate and transfer)

The sales department should be staffed with the specialists that cover all the functions and understand the main ideas behind the kind of contract they are bidding for. Forming this team the cross-check and support principles should be considered. This is crucial especially in preparing technical and financial offer since the cost of the mistake may even lead to bankruptcy of the company, in case some works are forecasted but not included in the financial offer, or, conversely, the company may lose the tender due to the high price in case of unnecessary works are calculated.

The searching for the clients is one of the most important tasks sales (sometimes called tenders) department should do. Most the construction companies work with both state/municipal and private projects. The main difference between these two kinds of clients is the way the tender is conducted and the way the decisions are made.

The private client is not limited by the way he/she is going to proceed with the tender. He/she may invite anybody they want and refuse anybody they want. The qualification criteria may be balanced and well developed or be bound to one person's subjective opinion.

On the other hand, the state or municipal tender is subject to many rules and normative acts, such as procurement law that guides all state procurements. The state/municipal tender procedure has to be transparent, and each person or entity can take part in it. The client cannot prevent participation of nobody that fits criteria.

Thus, the searching process widely differs for these two kinds of customers (private and governmental). The state, municipal authorities, and sometimes multinational public corporations are obliged to publish their tenders on special open state platforms and by so doing tenders become available to each and every participant at the same moment in time, while private invite whoever they want.

Searching for the clients, especially the private one, and convincing them to include the company in the tenderers list is very creative and challenging process. The agility, especially finding an inventive and innovative way of how to approach and convince the right person plays an important role. We should not forget that all activities in the company should have a cross department character. The tender department should communicate and ask for assistance all other related persons that might be able to offer it. However, this does not mean any shift in responsibility.

Tender procedures and valuation approaches

After the phase of searching for a client? is completed contractor is invited to participate in a tender procedure. It may be split in two phases of prequalification and technical and financial offer submission, or these two phases can be combined in one. According to Rintala et al. (Rintala et al., 2005) solutions to mitigate non-honest rivalry may include: the use of prequalification to select the appropriate private sector bidders, the utilization of bid bonds to ensure the bidders' commitment to the procurement process, the appointment of a reserve bidder to maintain client's bargaining power in the preferred bidder stage, the execution of due diligences early on in the procurement process to prevent changes in the details of the project during the uncompetitive negotiations leading to financial close, and the use of public sector intervention to prevent collusion and/or predatory behaviour.

Gastorna & Walters (Gastorna & Walters, 1996) introduce a qualifying level of service, which is available from all serious competitors and represents the basic need to

survive and remain in competition, or in other words the prequalification phase. The main task of a pre-qualification phase is to ensure that tenderer is able to implement the project. The qualification criteria should establish the weaknesses of the bidder, saving client's time and money. However, if the tenderer is qualified, it means that it meets all legal, financial and technical qualification requirement – meaning contractor and its personnel have enough professional experience and stability, so they can submit the financial and technical offers where the winner will be selected.

There are two different valuation methods, which should ensure balance between the needs of particular tender and transparency requirement: the lowest price approach and the multi criteria approach. In each of them the contractor should prepare qualification (technical and financial) documents and an offer that consist of technical and financial parts. It is up to the client whether the two phases, when qualification documents are submitted first and only qualified bidders prepare an offer, or both phases are combined in one.

It may seem that preparation of qualification documents or preparing technical and financial offers is a routine monotonous activity. It is not. There is a huge room for creativity, analysis, broad thinking and agility. The cross-departmental cooperation and quick and clear communication are vital here. Working within a very limited timeframe, in the environment of continuous new requirements from the client, and lack of cooperation from the bank or subcontractors, or reluctant attitude of partners, force to mobilize company's best resources and take a great deal of decision within ambiguous environment. Prompt updates, continuous communication, shared ideas, creative and multiple alternative solutions are key to creating winning offers. All these and many other questions are the reasons why resilience and fluidity combined with persistence and creativity may move mountains.

In conclusion the author has to mention that agility is important in all primary activities, including operations, inbound and outbound logistics, service, marketing and sales. For implementation of agility and the best practices, besides other activities a Captain model could be applied.

3.5. Corporate Agility in Strategy, Corporate Governance Organizational Behaviour, and General Management of the Construction Company

According to Nunnally (Nunnally, 2007) the major factors of the corporate failures in the construction industry include lack of capital, poor cost estimating, inadequate cost accounting, and lack of general management ability. All of these factors can be categorized as elements of poor management. Such studies indicate that at least 90% of all construction company failures can be attributed to inadequate management.

These four key elements, strategy, general management, corporate governance and organizational behaviour of the construction company are highly interconnected, depend and supplement each other. Strategy roots in general management and corporate governance, while organizational behaviour shapes the decisions and actions being taken by sole individuals or by organization as a whole. Therefore, all four will be reviewed together to outline the interconnections mentioned above.

Today change is an integral part of our lives and no organization can ignore. Chima & Gutman (Chima & Gutman, 2020) suggested the following three dimensions of “new normal” of change:

- It’s perpetual — occurring all the time in an ongoing way.
- It’s pervasive — unfolding in multiple areas of life at once.
- It’s exponential — accelerating at an increasingly rapid rate.

The ideal agile structure assumes that information should flow in a precise and fast manner. The decisions are made efficiently and quickly. The organization quickly adapts to ever changing environment and overcomes internal challenges. Thus far the support and the primary activities were scrutinized and discussed in details. Teams and departments that communicate, work, perform daily tasks come to work each morning. This chapter will deal with the upper strata – the general management that develop and deploy strategy and policies through corporate governance and organizational behaviour. These deployments are to motivate all departments to do as best they can plus a fraction more, while enjoying both the process and the result.

Agility in a strategy of the construction company

According to Langford & Male (Langford & Male, 2001) dynamic industries such as construction need to view their strategy in a more considered and structured way than they

may have done in the past, but moreover agility in forming strategy with a requirement for their eyes to be on the horizon as well as the bottom line.

To evaluate impact of the agility on the strategy, the definition of strategy should be explored:

- the creation of a unique and valuable position involving a different set of activities. (Porter,1996);
- strategy is about how an organization will move forward. Doing strategy is figuring out how to advance the organization's interests. (Rumelt, 2011).
- the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources for carrying out these goals. (Chandler, Jr., 1962).
- the pattern of decisions in a company that determines and reveals its objectives, purposes or goals, produces the principal policies and plans for achieving those goals, and defines the range of businesses the company is to pursue, the kind of economic and human organization it is or intends to be, and the nature of the economic and non-economic contribution it intends to make to its shareholders, employees, customers, and communities. (Andrews, 1980).

R. Whittington (Whittington, 2001) has described four strategic approaches: Classical, Evolutional, Processual and Systemic.

- Classical – confidently prescribes a rational, detached and sequential approach, offered as universal norm;
- Evolutional – consider environmental change too fast, too unpredictable and too implacable to anticipate and pre-empt. Recommend concentrating on day-to-day viability while trying to keep all options open;
- Processual – doubt whether either organizations or markets work with the ruthless efficiency, therefore incline towards patient strategies of incremental adjustments and cultivation of core competences;
- Systemic – insist that both the ends and means of strategy depends on character of prevailing social systems, and that therefore other approaches may be appropriate in some social contexts.

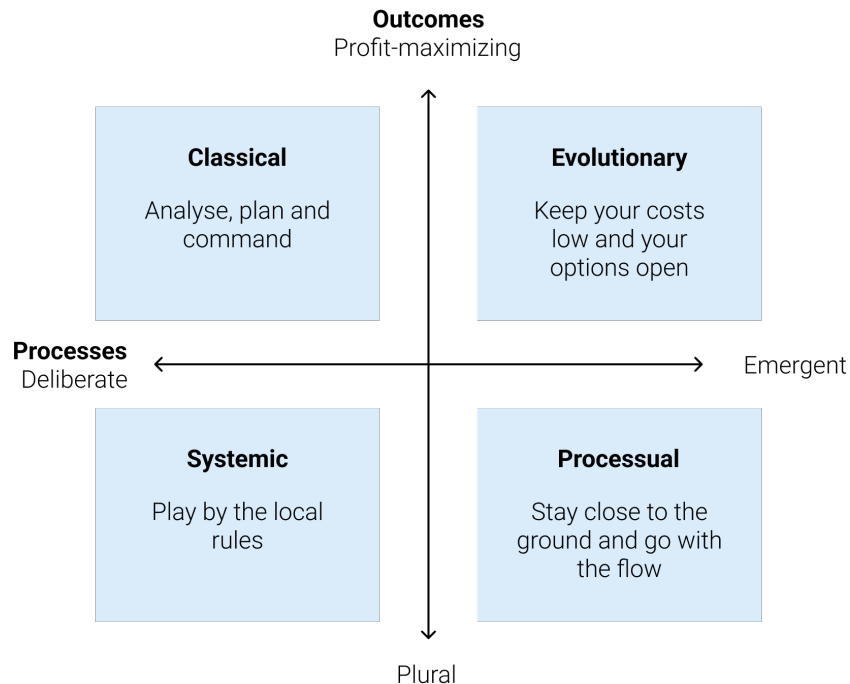


Figure 3.20 Summary of strategic perspectives and their outcomes, adapted from Whittington, 2001

As described above there is a variety of definitions and approaches that strategy can be addressed with. Nevertheless, all concentrate on goals, future development, and guidelines to achieve both.

Within the course of this research author would like to use the following approach to the term of strategy:

Strategy is a road map to the defined corporate goals through the permanent improvements and development of the competitive advantages.

As many researchers before him, Whittington detected different strategic approaches the company may implement. There is no one static situation where one particular strategy can be accepted and be followed permanently. Nowadays, a construction company should play in all four strategic fields and be ready to switch amid approaches should circumstances require. However, the evolutionary approach should be outlines separately. It may serve as a guideline for the company goals setting and strategy development. The key point to evolutionary approach is that of low costs (as much as possible in the construction industry) and to remain open to different options should provide a healthy turbulence within the organization and should not allow management to stay reluctant. Of course, a general path with clear goals should be defined and followed, to avoid a mess. The notion of continuous

expectation for and readiness to change should become a DNA of the company's behaviour and thinking.

Corporate agility is not a lack of strategy or a lack of planning, but an integrated set of tools that quickly transform the entity to be ready to reflect the new factors (internal or external) or situations. According to Accardi – Petersen (Accardi – Petersen, 2011) "It's not changing your strategy every time someone new comes into your office, and it's not allowing you not to plan. Planning for change is the paramount rule of agile... you need to start planning by looking at what your long-term company strategies are and what the constant of change will demand."

The company should set its goals. Discussing the goals, management should focus on very few primary goals that are the "final goals", and other subordinate goals pivot toward them. While setting goals, one should be both gritty and entrepreneurial, Duckworth (Duckworth, 2016) recommends envisioning goals in a hierarchy consisting of low-level goals, mid-level goals, and one top-level goal.

By creating the hierarchy of the goals, manager simplifies the process by splitting it into smaller sub-processes with their own goals. It forces each substratum to serve its upper goal, until the top -level goal is achieved. Furthermore, through discussions of the mid – and low – level aims, the management team will find out the specifics and technology on how to proceed and how to accomplish setting subtasks. This should eliminate part of the sub-goals, by so shaping the clear and coherent - agile strategy. The hierarchy of goals allows to always have an alternative way to achieving the final goal. Some of them will be eliminated through the internal discussions, others of the will end up in dead-end due to the external circumstances or part will never be reached due to the implementation failure, while remaining part will lift organization one level up.

There may be vast number of strategies and goals the construction company may wish to set. The sample of different priority goals and their potential clashes is shown in table 3.9

Table 3.9
Levelling of the goals and conflicts detection developed by Author

Level	Goals				Conflicts
Top level	Risks minimization		Sustainable growth		No conflict
Mid-level	Introducing new procedures and formalities	Staff training and studying program increase;	Turnover increase;	Profit increase	Potential conflict
Low-level	Hiring additional supervising staff		Entering new markets;		Explicit conflict amid several sub goals.
		Hiring more own work force;	Firing staff		
			Purchasing new equipment	Delegation of several responsibilities to one person	
			Opening new division for new kind of works		

The cross-departmental cooperation and work in mixed teams, help to identify potential conflicts of the goals in a timely manner. This agile approach of ongoing monitoring and changing allows to find a balance between the goals, having in mind the success of the company. For example, the existing staff may study in order to improve their professional skills, achieving a combination of minimization of risks with profit increase, or hiring additional personnel may be put on hold, and in-house HR resources may be used to improve the field of bureaucracy.

Summarizing this, author would like to outline the main steps to implementation of strategy using corporate agility's tools to improve operational performance and create a competitive advantage:

1. Defining and setting long-term goals.
2. Defining mid-term sub-goals and allocating necessary resources (financial, human, organizational etc.), discussing them in cross-departmental teams.
3. Creating the system of control and adjustments measures to monitor the progress of achievement of the goals.
4. Communicating the long -term goals, the paths to their achievement and setting monitoring and control mechanism within the company.

5. Avoiding long bureaucratic processes, the results of the monitoring should be easy to understand and decision on appropriate actions (if needed) should be taken quickly.
6. Re-evaluation of the long-term goals on annual basis.

After the strategy is set it is imperative to follow it up, monitor, control, push and sometimes adjust and adapt according to the changing environments and challenges the construction company faces.

In other words, set strategy should be agile, with several potential interim by-passes for sub-goals achievement, but the most important is to continue the re-evaluation of the long-term corporate goals. It has to be done in order to maintain the connection with reality, with the ongoing progress and changes the construction company goes through.

Agility in Corporate governance of the construction company

Corporate governance (for definition and analysis please see chapter one) has a huge impact on the executive management of the entity. Successful performance of the company is directly related to a degree of freedom the management feels they have to do its utmost to achieve the results. As was discussed above, it is a key to understand what corporate governance model best fit for the company is. Author focuses on the Baltic States as integral part of the EU market, so this model may be taken as a basis. However, in today's age of globalization one will not find a classical model that will suit a particular region anymore. Talking about the EU, we should bear in mind that it is comprised of more than two dozen countries, which vary in their cultural perspective and historical background. Furthermore, as was mentioned before, the construction sector is highly segregated. This means there are very few truly large companies, while most are midsize and small ones. In discussing this point with experts (see Appendix 12), it was suggested to examine this situation through Latvian market and review two options of the corporate governance of the Latvian construction company:

- the subsidiary of existing big international company;
- the company found and developed by an individual or a small group of individuals.

The former model anticipates for a newly established subsidiary (either founded or purchased) to inherit the model of corporate governance accepted by the parent company. Since corporate governance is about control, so the managers of the parent company will deploy the model they are accustomed to.

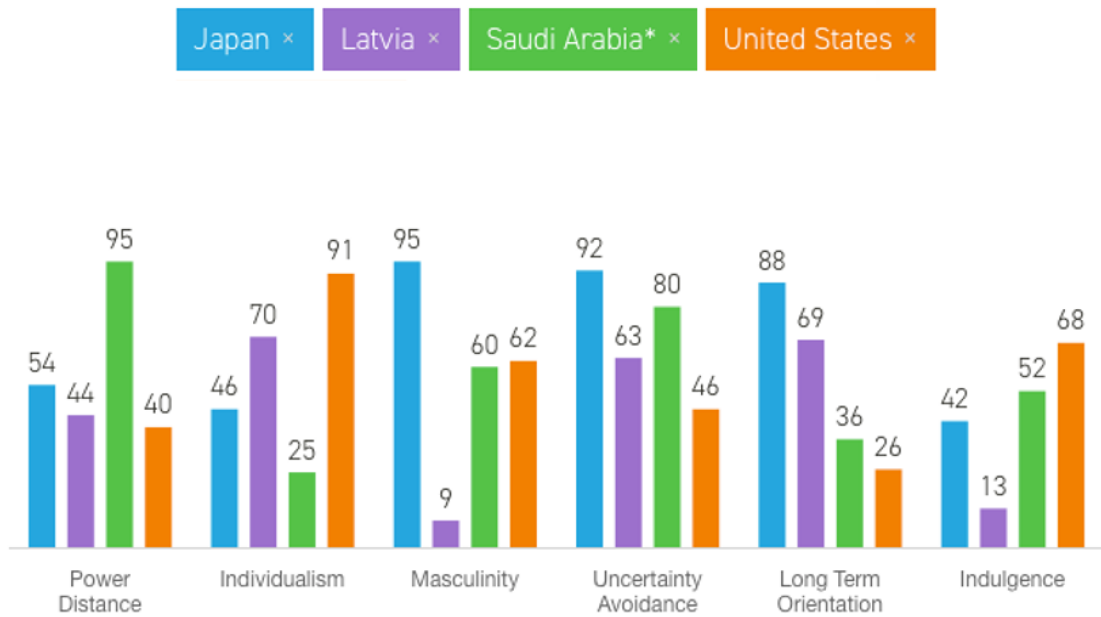


Figure 3.21 6 cultural dimensions of Japan, Latvia, Saudi Arabia and United States. (Compare countries (2022) [online]. Hofstede Insights homepage.)

However, it is important to recall that top management control model will have a direct impact on the lower levels of the organization. Choosing the model the owners and the top management should reflect on major aspects – the mutual relationship – trust, loyalty, transparency and the freedom to act. On the other hand, they should understand that even if there is an ideal and comfortable relationship between very few top managers and very few owner’s representatives – the rest of the company may not be able to accept this way of functioning and will continue to operate as per locally acceptable norms. This situation may rise to big conflict of expectations versus results, all the way to up to failure of the operation. For example, due to the relatively high level of individualism it is commonly acceptable in Latvian construction projects to make relatively quick decisions. The client, the subcontractors, employees and other stakeholders are used to that. Their actions assume that there is no need for long discussion and coordination period before the decision is made. Each level is more or less aware of its limits, and it has been working that way for decades. If, suddenly, the decisions to be made are taken from the site level and raised up not just to the local company’s management but to the headquarters in Japan, it may paralyze the site and highly demotivate all participants. Another example would be the same situation with the American approach. The financial-result orientation and constant pushing ahead might stress

and demotivate the Latvian project team the same as not having the ability to make decisions in case of Japanese approach.

The other case to review is when the company is founded and developed by a local individual or a small group of individuals. This means there are no issues that come from the impact of other culture and atmosphere within the company, and more or less fits the local cultural habits. At the same time, such an arrangement might lead to a risk of an undesirably great influence of the founder or owner on the company. Person's cultural and psychological singularities have a much bigger impact on the way the control of the management is implemented, rather than any international model.

Spanos (Spanos, 2005) found that concentrated ownership structures and large dominant shareholders, tend to control the managers and expropriate minority shareholders in order to gain private control benefits.

Very often construction companies are founded by professionals that gained enough experience and connections working in the big companies and decided to become independent. In this case he/she will mix personal beliefs and previous governance experience when building the company.

As shown above, the issue of agility in corporate governance in both cases of a locally developed company or by way of international expansion should be taken into account. Yusoff and Alhaji (Yusoff and Alhaji, 2012), summarized that corporate governance is concerned with the social political and legal environment in which the corporation operates systems practices and procedures-the formal and informal rules that governed the corporation. In a nutshell, corporate governance is vital in every organization, because good corporate governance contribute to better firm performance, it is expected for every other organization to enforce corporate governance policy, to achieve a stated goal.

Agility in Organizational Behaviour of the construction company

As it follows from the definition provided above (please see chapter one), **organizational behaviour** is about people and processes. The primary and support activities were already discussed, as to explore the activity and to discuss overall agility of this activity.

One of the keys to agility is not so much coming up with an innovative response as the capacity to innovate. This capacity involves various aspects of organizational behaviour which

research has shown to have a marked impact on innovation (such as high workforce commitment, flexible processes, cross-functional links, etc (Bessant et al., 2002).

General management's prime tasks on the one hand is to deploy flexible procedures and shape flexible structure within the organization. At the same time, the organization should invest in its staff, to develop it and to embed the agile achievement orientation and broad thinking at all levels. According to vast number of research, and personal experience of the author, one of the most vivid problems of agility, especially in large companies, was **conflict/contradiction between internal formal procedures and informal real life processes**. Some companies may solve the issue by implementing the system of adjusting its internal procedures (in cooperation with the relevant departments and stakeholders) to the real-life day to day processes, keeping balance between the necessary minimal core requirements and which should be adjusted accordingly for smooth operation. In other companies instructions are developed at the group's level and cannot be adjusted, thus a system of informal relationship should be developed to bypass the rules. The figure 3.21 shows the well-balanced structure of the organization. "The larger the variety of actions available to a control system, the larger the variety of perturbations it is able to compensate" Ashby, (Ashby, 1956) or in other words, according to Hildret & Kimble (Hildret & Kimble, 2004) "the organization can control something... to the extent it has sufficient internal variety represented within the organization..."

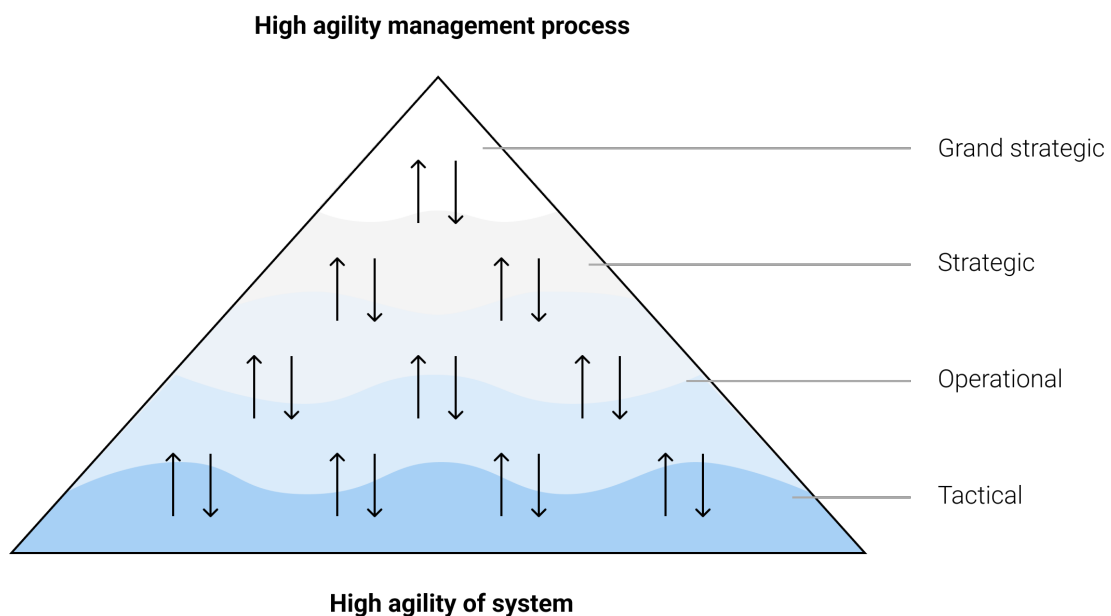


Figure 3.22 Information Age Management applying Ashby's Law adapted from Atkinson & Moffat, 2005

Atkinson & Moffat (Atkinson & Moffat, 2005): claim that “...management had to have lateral and vertical agility and interactivity, across and through the different levels...” as shown in the figure 3.21 above. Each unit/team/person is not limited and is capable to solve the problem using alternatives and nonstandard options, whilst keeping the total hierarchy in place. The structure above supports and maintains the agility, reaction time and adaptation ability of both the whole system and its subunits for the changes to come. In order to proceed with the suggestions of improving agility of organizational behaviour of the construction company, **author suggests observing the staff, individuals and groups existing in the construction company, while identifying the potential problems.** It is important to recall that one person may act as an individual and as representative/member of *different* groups depending on the situation. Summarizing previous studies, and author’s personal experience, author concludes that corporate agility within a construction company mainly is a matter of organizational processes on a management levels (low, middle, and top), while technological and individual cooperation amid “blue collar” workers on the construction site have almost no impact on corporate agility. Therefore, they are excluded from the scope of this research.

As discussed in chapter one, there are three major levels of... *micro, meso* and *macro*. According to Motzko et al (Motzko et al., 2013) the accepted orthodox concept within the construction industry has been close relationship between ethical behaviour and the notion of professionalism. Fehlau & Stock (Fehlau & Stock, 2012) found that a conflict exists when interests, objectives or values of individuals, social groups or organizations are incompatible with each other or appear inconsistent (interpersonal conflict). When people with different views and attitudes, expectations and authority potentially misunderstandings and conflicts are hard to avoid. According to findings of Duckworth (Duckworth, 2016) most of the people are attracted to the things that they enjoy, and only afterwards they try to understand how others may benefit from these personal areas of interests. Janowski (Janowski, 2022) found that the agile transformation follows not only methods but also values and principles. This leads to the new mind-set and change to self-managing teams, which requires a re-orientation for whole the company and not only for the project or team employees. This way of working must include an agile mind-set in order to be an agile organization. For the purpose of this work author has developed a table where the levels of agile organizational behaviour in a construction company are presented.

Table 3.10

Micro level of organizational behaviour of the construction company developed by Author

Micro level – individual		
Personal role and aims	Education and professional skills/competences	Specific team’s characteristics of the team in a company
<p>Employees are first of all human beings, individuals with his/her problems, background, family, education, friends, enemies, diseases, ambitions and etc. For the individuals following aspects should be considered:</p> <ul style="list-style-type: none"> • personal goals and motivators. • identification of individual with the company and its attributes. The main task of the management is to understand the personal aims, motivators and type of character of the employee. (Adizes, 2018) model for 4 types of people, Integrator, Entrepreneur, Administrator and Producer can be used). • staffing the teams/groups using personal and professional typological approach. Organization should put the employee in maximally suitable to <i>his/her type</i> working conditions and align individual’s personal goals with corporate ones. promotion of personal and professional development should ensure broadly thinking loyal professionals that are ready to face any challenge and do have clear answer to the questions “Why do I work here?” and “What do I want to achieve?”. 	<p>Has one or has not an engineering education/background? This is the first allocation the engineers make in their minds when they are being introduced to the new colleague. The following aspects to be considered:</p> <ul style="list-style-type: none"> • engineering education (yes/no); • potential arrogant attitude from engineers (professionals) towards non-engineering employee. • feeling of belonging to “exclusive group that possesses sacral knowledge”. • understanding that engineers are the core staff of the construction company. They are those who work hard and earn money for the company. Other departments are only spending. • real professional valuation should be done to align CV self-description with actual professional competences of particular individual. • acceptance/ignorance of superior authority if he/she does not possess technical education and/or lacking real construction experience. 	<p>Dangerous potential segregation within the company should be avoided. The company in any case should not discriminate or abuse any human being based on his/her:</p> <ul style="list-style-type: none"> • race, • gender, • sexual, cultural aspects. • religion • political preferences.

Most of the professional organizations will require their members to behave or act in an ethical manner within their code of conduct. However, in not-so-distant past, professionals also came under criticism for becoming self-serving monopolies with detrimental outcomes for the industry as well as disempowering the “non-professionals” whilst facilitating control on behalf of elite groups. Creating groups will cause uncomfortable feelings and tensions within the organization, and outside it, especially if company operates in different markets. The actual situation according to Eurostat report of 2016 (Jobs split along gender lines. [online] Eurostat report of 2016) that there are only 3% of women are employed in “building and other related trade workers, exclusion electricians” positions, while male employees also enjoy higher salary (about 20%) and get easier promotion (Labour Force Statistics from the Current Population Survey (2021) [online] U.S. Bureau of Labour Statistic). Such situation should be avoided.

Being part of a group creates a feeling of belong. There are three kinds of groups in the construction company. Cross-departmental teams, Construction project teams and Structural units. Even though construction project teams belong to technical or construction departments, sometimes they are so big and multifunctional that they may include most of the functions the whole construction company embodies. According to Biermann (Biermann, 2005) the leadership of the employees is a challenging task for site managers and foremen. The site manager and the foreman are responsible for directing the proper execution of the services. This is done through the presentation of results to be achieved and the mechanism (steps) how this is to be achieved. Raiden et al (Raiden et al, 2005) suggested the following approach of the deployment of the team:

- technical competence (from job descriptions, experience summary sheets and chartered status records) ;
- personal development assessment (to support technical competence evaluation and provide information on personal aspirations, needs and preferences) ;
- personal relationships (line managers' subjective knowledge on how the employee works with other people/ as part of a team);
- time (employee availability re: current project/ commitments, potential disturbance of a move mid-project). These guidelines may be used for the formation of both, project teams or units within the organization.

Therefore, the points to be taken into consideration evaluating organizational behaviour of the groups at Meso level are provided in table 3.11.

Macro level (table 3.12) in turn, addresses the "behaviours" of organizations as entities. Author reviews the construction organization both as an entity through its managerial levels and as a Joint Venture or Partnership when two or more construction companies create a venture to participate in particular tender and to perform works in a particular project, without creating new legal entity. This form of cooperation is widely used throughout the construction industry and such multinational, multicultural and multi-organizational teams are the big challenge for all: for a project manager of joint venture's team and for the management of each partner. Overcoming these challenges and creating common target-oriented cooperative teams is a key to success or fail of the project, and not a technical difficulty of its implementation.

Table 3.11

Meso level of organizational behaviour of the construction company developed by author

Meso level – group level		
Structural units	Construction project team	Cross departmental team
<p>If the Macro level's groups were formed as a cross organizational strata, these ones form the structural units. The unit should be staffed and operate following guidelines. Each unit:</p> <ul style="list-style-type: none"> • Is staffed individuals are staffed using guidelines and descriptions discussed for Micro level. • Has its own goals. • Has its clear flat internal hierarchy. • Has clear place within corporate structure. • Understands corporate goals. • Communicates, assists or cooperates with other structural units to achieve common goals and improve procedures. • Has its own KPIs and motivators. • Maintains open internal communication and valuation procedure. • Reporting. 	<p>Construction project team should be staffed and operated considering the following factors/guidelines:</p> <ul style="list-style-type: none"> • Cross departmental team vs belonging to one structural unit (depends on the scale and complexity of the project). • Project manager is an ultimate team leader for the whole aspects of the project and management. • Team has clear flat internal hierarchy. • Team consists of: foremen, engineers, estimators, technical assistants and secretaries, that may form smaller project team' sub-groups, or outsource functions like legal or bookkeeping. • Project is supervised and assisted by the main office. • Team is staffed using guidelines and descriptions discussed for Micro level. • Team should understand both corporate and project goals. • Team maintains open and transparent internal communication, valuation and cooperation. • Team has its own KPIs and motivators. • Team operates following the procedures for management of the construction project and improves them. • Team creates and follows their own internal rules for behaviour and operation and set clear responsibility limits. • Reporting. • Knowledge sharing between different project and within the team. • Construction projects are the only income source for the construction company. • Construction projects are the source for the most extensive spendings and risks for the construction company. • Complicated stakeholders' management. • Operation in highly uncertain and rapidly changing environment. • Management of large number of workers on the site (own and subcontracted). 	<p>Highly advanced combination from organizational behaviour point of view. Such teams are the core of corporate agility. De Weerd et al (De Weerd et al., 2020) found that the key characteristic of an agile project is the empowered, cross-functional team, which works across silos to create end-to-end accountability. Egan (Egan, 2002) argued that integrated teamwork is the key to construction projects that personify good whole life value and performance. Integrated teams deliver greater process efficiency and by working together over time can help drive out the old-style adversarial culture and provide safer projects using qualified trained workforce. Cross departmental teams should be staffed and operated considering the following factors/guidelines:</p> <ul style="list-style-type: none"> • There is a common project where multitasking and multi competent team is needed. • Team is staffed based on the project needs and goals, preferably using guidelines and descriptions discussed for Micro level. • Team has its clear flat internal hierarchy, with ONE accepted and authorised team leader. • Team leader acts on behalf of the whole team without preferences to the members from his/her structural unit. • Team should understand both corporate and project goals. • Team maintains open and transparent internal communication, valuation and cooperation. • Team has its own KPIs and motivators. • Team operates following the cross departmental procedures and improves them. • Team members are working outside their daily routine, facing new challenges and cooperating with people that may have a diametrical typology or work approach. • Team creates and follows their own internal rules for behaviour and operation and set clear responsibility limits. • Heads of structural units the cross departmental team members come from should communicate only with the team leader avoiding direct communication with their "former" employees. • Reporting.

Good sample of cross departments cooperation is preparation of the complicated tender, when qualification documents, technical descriptions and financial offer are being submitted at once. It would be reasonable to involve employees from tender preparation department, technical department and legal department. Being a responsible for the whole process, the head of tender preparation department, should become the leader of this team. Through the real involvement of the discussions and brainstorms, mutual assistance and cooperation the final product – developed tender documentation will be much better, rather than regular formal request from one department to another would come.

Table 3.12

Macro level of organizational behaviour of the construction company developed by author

Macro level*			
Nr.	Challenges	Construction Company	Joint Venture (hereinafter JV)
1	General	A single construction company, including branches or subsidiaries. Owners and management have common goals of successful operation and development of this organization.	Consortium or cooperation of two or more construction companies, with different owners, management, and operational teams, that joined for one common goal – successful completion of one project. All partners bear joint and severe liability. There is vast number of reasons why independent entities would jointly work, for example, lack of resources, not sufficient qualification, new markets, risk minimization etc. They may be from different countries with different cultures and business approaches.
2.	Goals and means	A company has its goals, and allocate means to achieve them.	Each Partner has its own goals in terms of development, risks, profit, market share etc. The goals for JV should be set, and partners should agree on the resources (financial, human, materials etc) how it should be achieved. Kang et al (Kang et al., 2006) found that multicultural project teams involve people from a wide variety of cultures, there is no guarantee that the use of espoused good practices will result in successful project outcomes.
2.	Hierarchy	A company has its clear hierarchy. It can employ bottom up or top-down approach.	Each partner has its clear hierarchy. Often, they strongly vary from one to another. Therefore, a new a hierarchy should be established and agreed.
3.	Structure	A company has its structure. For development of agility in a construction company it should be organized as flat as possible. The whole organization should behave as one mechanism, enhancing cross departmental communication and cooperation at all levels.	Each partner has its clear structure, while its employees are used to particular decision-making process and responsibilities. JV should develop and new structure of different levels of decision-making. A board or supervising committee should provide an answer to the strategical and general challenges, while JV project management team to the operational.
3.	Levels of management	<p>One company's levels of management are:</p> <p>Small group leaders -here the professional duties and particular task(s) limit both the ability to affect and to deploy agility. However, if the group leader explains and shows a self-sample of both: fulfilment of the directly assigned or defined duties, and agile approach of broad thing and crass group cooperation. The soft supervision and self-sample from the upper-level managers is required.</p> <p>Mid-level management is formed by heads of departments and teams, project managers. Important element: managers of this level form “shell and core” of the construction company in terms of agile organizational behaviour. The soft supervision and self-sample from the upper-level managers is required. (see table 3.11)</p> <p>Top level management of the construction company it tis management board level, CEO, heads of divisions (COO, CFO, technical director etc.), The goals, strategy and organizational structure are set and shaped at this level. This managerial level is discussed in chapter of 3.5.4.</p>	<p>JV levels of management differ from those of single construction company. Tuutti (Tuutti, 2005) stated that the management team in a construction process will be challenged to both satisfy the client demands and to fulfil the operations with a positive return on invested resources. Fewings & Henjeweile (Fewings & Henjeweile, 2019) states that the project manager should aim to create an environment in which the team member can achieve outlines of personal as well as project goals. This means using a problem-solving and no-blame culture where issues are identified, communicated, and tackled early in the process. JV project management team usually has broader responsibilities than a regular team that manages construction project. Apart of all specific project requirements, JV project management team is also responsible for such activities as JV finance, JV human resources, marketing, legal and administrative activities etc. All these puts a JV PM team in a unique position (if compared to the structure of a single construction company) being obtaining part of the functions that usually a top management do. Challenges while managing small and mid-size teams of JV are the same as those of a single construction company.</p>

Table 3.12 continued

4.	Key points to promote agility at the Macro level	<ul style="list-style-type: none"> • Broad thinking beyond the direct one of responsibility of particular group/department • Promoting and explaining the departments and corporate goals all together with the activities required for their achievement. • Following procedures and improving them in case of complexity or unnecessary. • Lead cross departmental teams. • Maintaining open and transparent communication and a flat hierarchy. • Alignment of personal and corporate goals of particular department's employees. • Honest and balanced attitude towards their department employees, including support and protection. • Disputes and conflicts management within and beyond department, trying to solve through cooperation with the same level colleagues. • Promotion of corporate values and strategy. • Proactive communication and actions within and beyond company, on behalf of the common corporate goal. • Staffing subordinated teams and groups. • Knowledge and information exchange. 	<p>The key points needed to promote corporate agility withing JV are the same as for a single construction company. However, there are several points to be considered while operating within joint venture to help to keep effective and agile:</p> <ul style="list-style-type: none"> • Flat but clear hierarchy withing the project team and within JV. • Communication and exchange of information within the project team and within the JV • Avoiding conflict of interests among partners and project. • Align partners goals with project goals. • Clear rules, procedures and routines agreed by all partners and project team should be made. • Binding JV agreement should be signed. It should set the principal of how JV is acting – splitting the works to partners or acting as a pure general contractor, and other cooperation guidelines (responsibility, decision making, profit/loss sharing and etc) • Transfer of the knowledge, especially from one phase of the project to another. • Teambuilding and distrust avoidance among the project team members and JV partners. <p>The relationship within the joint venture team is highly important. Bad atmosphere, distrust, arrogant attitude may cause a huge damage to the project. If the project leaders cannot cooperate as one solid entity that has common goals, the project will fail. The client and subcontractors will use this situation to improve their positions, in parallel the schedule and the quality will suffer, that in their turn will bring to the sanctions from the client's side, causing significant losses. Thus, joint venture's team's organizational behaviour is much more important than the project team that origins in one company.</p>
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*relationship with other stakeholders reviewed in chapter 3.4.3.

Motzko et al (Motzko et al., 2013) found that from both the employee's and the company's point of view a position well suited to the employee's level of professional competence will be more beneficial than even the most spectacular promotion. Therefore, staffing any managerial positions should be as objective and professional as possible. Promotion and penalising should avoid any personal relationship– resting only on the best corporate interests.

The basic assumption of any manager at any level should be that people come to do their work in the best way they can. If person feels he/she is not trusted, the trivial data and information are prohibited or are not shared, amount of formal papers doubles that of substantial documents, there is no freedom to act and to make decisions - then an antagonism will prevail.. According to Motzko et al (Motzko et al., 2013) The tasks of conflict management are to avoid conflict in advance, to due emotionally charged conflicts to a factual level, to prevent any extension or escalation of conflicts to resolve existing conflicts and to promote a future smooth teamwork.

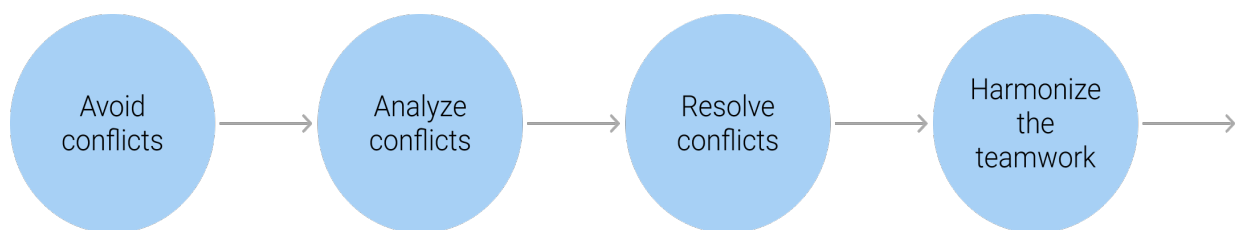


Figure 3.23 Conflicts management algorithm, adapted from Motzko, 2013.

Maimon (Maimon, 2017) suggests to use the following guidelines for solving or avoiding the conflicts:

- **Encourage openness to productive conflict.** First and foremost, self-managed teams must commit to openly discussing their differences. Conflict should be seen not as an annoyance that leads to anxiety and alienation, but as an opportunity for growth and strong working relationships.
- **Prioritize accountability over blame.** Autonomous teams should win and lose as a group. When shortcomings occur, teams shouldn't assign blame to the contributors closest to the debacle. Rather than looking at who was responsible, as people express only the symptoms, they should investigate why the issue occurred.
- **Quantify the impact of the problem.** It encourages productive conversations, creates alignment around the gravity of the issue, and unlocks creative solutions as people identify both the source and the impact of their conflicts. Assigning a numeric value to waste helps teams find better ways to reduce it.

The conflicts in a construction company may arise within one team or a group (site management team or marketing team), in such a case usually the team leader or his/her direct superior can resolve it, since often it is a problem involving one or two specific persons. A

larger problem is posed when the conflict becomes cross-departmental, or with an important stakeholder, or in the case of a joint venture a conflict among teams representing different partners (companies) –in this instance it may lead to a significant malfunctioning or even breach of contract, which in turn may cause huge direct losses. Here the role of team or group leader is extremely important. Timely detection may resolve the situation through one open conversation. The team leader should always put a conflict avoidance as first priority. However, if conflict occurred, it cannot be ignored, and should be resolved in a calm, but comprehensive manner, until it is over and the teamwork is harmonized. It is important to highlight that flat operation and direct communication between departments is a two way street. It is important not only to get the lawyer, the quality manager or the bookkeeper involved, the Project Manager should also understand the limitations and guidelines to the project provided by those departments. It is important to discuss in an open and constructive manner any problem or item that may affect the project. It is obviously a must to have plan for a few steps ahead and to listen to the mutual arguments.

In order to present the variety of groups the employee may belong to, author created a table 3.13 describing the challenges of the technical secretary (hereinafter TS) faces while fulfilling his/her work duties. Despite the TS is one of the lowest level positions in the hierarchy of the construction company, he/she does a highly important work, that affects the whole construction project. The table should assist managers in all staffing, daily management, and conflict avoidance.

Table 3.13

A sample of individual belongingness to variety of the groups within construction company
(developed by the Author)

Team	Belonginess	Remarks
1	2	3
Individual	Yes	20 years old, female, single, student at the faculty of the civil engineering, wants to become project manager at the international construction company. Likes travelling and reading.
engineering education	yes	if TS is a student or recently graduated specialist elder or more experienced engineers and colleagues may agree to mentor her, to assist to grow professionally, if they find person has a passion of what she is doing and simultaneously studies in the profile university.
top level management	-	-
mid-level management	-	-

Table 3.13 Continued

1	2	3
rank-and-file employee	Yes	TS is one of the lowest stratum in the construction hierarchy
particular division/department/team/group	Administrative division/quality management department/quality management team/technical secretaries	TS may belong to the implementation department, however since one of the main tasks secretaries is to maintain the as made documentation and to prepare the project for delivery from documental point of view it is recommended to subordinate TS to the quality management team, that delegates TS to the project management team. Project manager become the direct superior of the TS for the project lifetime only, but he cannot fire TS, only to extract her from the project. Such division allows to deploy better quality management system at the construction sites, since often project team rushes ahead with the work, forgetting to formalize documentation, that is vital for the works acceptance by the client and payments receiving. Some documentation that was not finalized during the performance of the works cannot be restored at all.
construction project team	Yes	
cross departments/cross organizational team	Yes	
joint venture	No	The role of the TS in joint venture depends on the way the joint venture is being managed.
group based on similar race, gender, sexual cultural, religious or political background	Female	Being a female TS belongs to one of the most unprotected minorities in the construction industry, being totally dominated by males, especially at the construction sites, females are often abused and receive lower salary comparing to their same level male colleagues.
	Latvian	No problem observed while working in Latvia. In other countries especially in "western" developed economies she may face arrogant attitude, because she comes from emerging state.
	heterosexual	Sexual orientation usually is not being a topic, however in Latvia LGBT community representatives often face hostile attitude.
	Christian	No problem observed while working in Latvia. In other countries especially in regions involved in ethnic and religious conflicts may become a problem.
	a-political	No problem observed
Personal goals Vs corporate goals	Partly aligned	TS wants to become a project manager in international company, to make it true, she has to obtain necessary experience and complete her education. Company may be not interested in her promotion or company may not have ambitions to expand abroad.
Identification with the teams goals	Full	TS understands team's goals and theses are aligned with her personal goal of obtaining professional experience.
Communication within team	Good	Consequences of lacking or struggling communication were presented above

As illustrated above, one individual may take part in different groups, where he/she should adjust him/her-self, to adopt to new roles and behave accordingly as individual and as team member. However, such variety of environmental conditions shapes the personality, allows to understand that there is no “black or white” approach. Often some issues that seem obvious from individual or particular job position perspective, appear to be the opposite if the consequences are analysed from department or whole entity point of view. Such “roles game”, if correctly communicated by management significantly reduces dissatisfaction among the employees, if they see that particular decision has its logics and is made not to harm them specifically, but to gain positive capital to the company. Adaptation of self-behaviour, analysing things from different points of view, correct communication, broad and creative thinking, flexible persistence, goals and sub-goals definition and adjustment are the factors company should promote to achieve agile organizational behaviour.

Agility in General Management of the construction company

After all, **three main** topics of **corporate agility** in strategy, corporate governance and organizational behaviour were discussed separately, corporate agility of the general management should be reviewed. As was mentioned previously, the general management of the company, depending on its structure includes either management board if it has few members and chairman, and duties and fields of responsibility are split. It may be CEO and few deputies, in case it is one tier structure, and operational and strategical management done at this level. The high-level managers are being paid not to be involved in routine, they are being paid for having a bird’s eye view, dealing with strategy and future development, and setting guidelines and implementing ongoing control on operational daily issues. According to Podolny and Hansen (Podolny and Hansen, 2020) giving business unit leaders full control over key functions allows them to do what is best to meet the needs of their individual units’ customers and maximize their results, and it enables the executives overseeing them to assess their performance. Janowski (Janowski, 2022) found that a successful agile transformation is a complex, long-term process that is supported by all people in the organization. Agile work approach requires methodological know-how as well as agile principles and values that are respected and lived by everyone involved. Ideally, this starts at the top: only when the changed attitude becomes noticeable and visible in the leadership type can the organizational culture develop holistically.

Author suggests reviewing the course of action and tools the company's management should follow to deploy and nurture the corporate agility in an organization. Pal & Panteleo (Pal & Panteleo, 2005) found that transformation to an agile enterprise is an evolutionary, not a rip and replace process. According to the Burke – Litwin Model (Burke & Litwin, 1992) of organizational performance and change (please see figure 3.24), all elements and factors within organization are interconnected and affect each other.

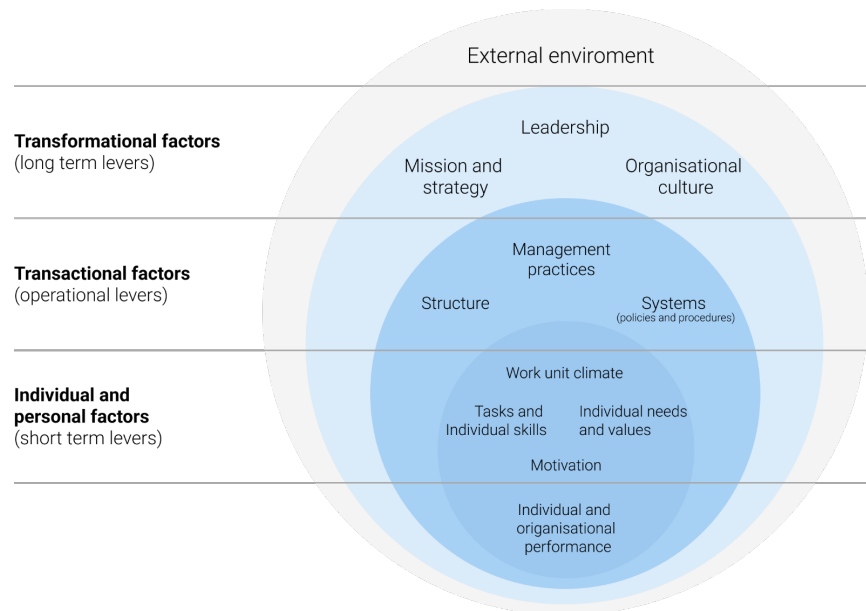


Figure 3.24 Model of organizational performance and change adapted from Burke-Litwin, 1992.

The model above should be the map in the hands of top managers that are going through the maze of managing construction company. The guiding idea of permanent change and transformation that will affect almost everything should be the tattooed in the minds. This model encompasses all major topics discussed in the previous sub-chapters (Strategy, Organizational behaviour and culture, Structure and Systems cover the corporate governance) while other topics were reviewed within the research and analysis performed. However, one subject matter is particularly important to discuss within the frame of general management – the Leadership. Burns (Burns, 1978) suggested the following definition of leadership - it is the reciprocal process of mobilising by persons with certain motives and values, various economic, political and other resources, in context of competition and conflict, in order to realize goals independently or mutually held by both leaders and followers.

Any society or organization has its individual hierarchy. Kanter (Kanter, 1989) found that in a growing number of companies, for example, horizontal ties between peers are

replacing vertical ties as channels of activity and communication. Companies are asking corporate staffs and functional departments to play a more strategic role with greater cross-departmental collaboration.

Katz (Katz, 1974) suggested that effective administration rests on three basic developable skills: Technical, Human and Conceptual. These three skills are interdependent, but Katz attributed their relative importance to different level of administration as shown in fig.3.25

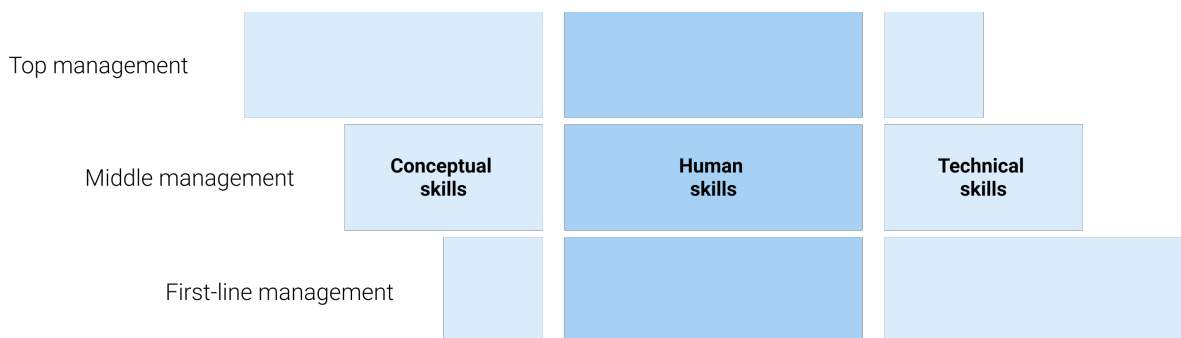


Figure 3.25 Administration skills at different management levels adapted from Katz, 1974.

Janowski (Janowski, 2022) claimed that the most important requirement is to give up control and micromanagement as well and to trust the employees and not to execute the autocratic principles.

The operational (technical) problems should be solved up to mid-level management, where all daily issues are being finalized. Otherwise, the company would degrade or stagnate since nobody would have time and energy to deal with strategy and development. Only critical issues to be brought to the top management level for discussion. Approval of bid price for a large-scale project, big claims, significant safety accidents and so on. The Human capital development and communication (human skills) are important at all levels and play a significant role, as will be discussed below. The Conceptual skill of ability to see the big picture, set general guidelines and goals, develop strategies and make necessary cross organizational restructurings are left to the top- level management.

All parts of primary and support activities discussed above are directly related to the general management. None of the issue or procedures in the companies should be skipped by it. It does not mean that CEO should lay concrete by him/her self, but it means that the top managers should guide, control, set strategy, objectively solve problems, deploy policies and procedures, introduce new development options, inspire by self- example, lead the change

and continuous transformation. Ramalingam et al (Ramalingam et al., 2020) found the responding the crisis (or change) requires adaptive leadership. They suggested the 4A's model describing the basics of such leadership:

- **Anticipation** of likely future needs, trends and options.
- **Articulation** of these needs to build collective understanding and support for action.
- **Adaptation** so that there is continuous learning and the adjustment of responses as necessary.
- **Accountability**, including maximum transparency in decision making processes and openness to challenges and feedback.

According to Swanson (Swanson, 2019) research shows that organizations drive better results when employees feel heard. A study found that a national restaurant chain saved \$1.6 million and decreased its turnover rate by 32% when managers had access to senior leaders to share ideas and voice concerns (Detert & Burris, 2016). Thus, flat structure, where access to the direct superior and one above him/her is not too bureaucratic and relatively easy, is preferable. Such structure usually shows better performance and higher satisfaction of the staff. According to Pablo Isla (McGinn, 2017) Indetex has a very flat structure. It does not have many formal meetings. In fact, Indetex doesn't even have a formal management committee. People are empowered— they make decisions themselves after a lot of informal conversation and walking around.

Summarizing findings of several researches (Burns, 1978; Ofori & Toor, 2012; Yand et al, 2022; Liphadzi et al, 2018; Sytch, 2019; CIOB 2008 etc) and author's personal experience, author created a Leader's abilities and skills interaction model of the construction industry (please see fig. 3.25). This model covers aspects, which should be taken into account for development and maintenance of corporate agility

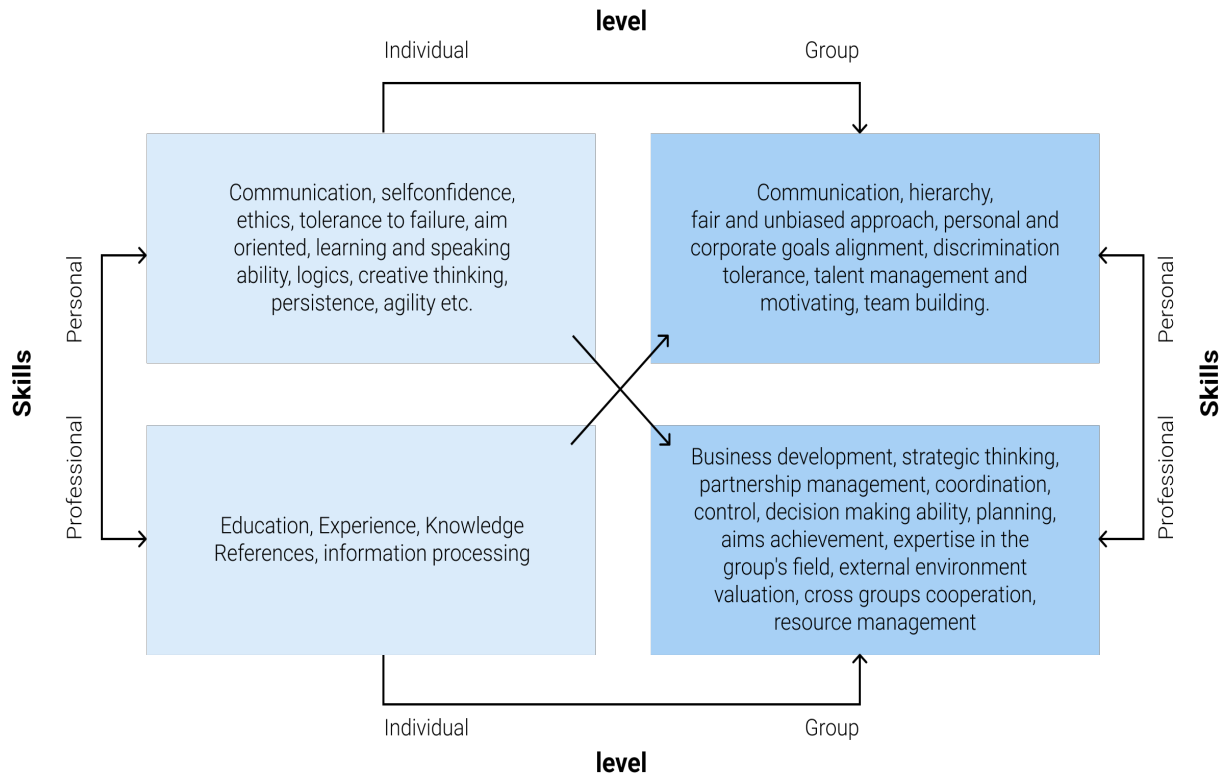


Figure 3.26 Leader's abilities and skills interaction model developed by Author

People need superiors to guide, to make decisions, and in many cases to solve conflicts, or in other words to judge. There are always informal and formal ways of leading.

According to Sytch (Sytch, 2019) - Informal power — which is unrelated to the formal title — can enable one to mobilize resources, drive change, and create value for the organization as well as oneself. A conflict within a group/organization may derive due to clash or lack of any of the skills mentioned in the model in fig. 3.26.

It is highly important to avoid clash of formal and informal leadership within a group. Formal versus informal leadership directly correlate with formal procedures versus informal bypasses. As the later is avoided by permanent monitoring and amendment of corporate procedures, as former must be monitored and solved by a superior manager. So the leader should feel the atmosphere and communicate with his/her team. Jensen (Jensen, 2019) found that most leaders, confronted with an upset team member, view negative emotions as a contagion to contain before it infects the broader team. It is quite common in case of conflict between the management and the team, the informal leader appears. Such crisis of leadership and trust is not acceptable. The general management of the company should do everything to maintain the staff solid as much as possible. According to Chima & Gutman (Chima &

Gutman, 2020) The days of “leader as hero” — the solo, individualistic leader who inspires certainty in a deterministic way forward — are over. Macomber (Macomber, 1989) states that construction is a major obligation for many growing companies. The initial estimates of cost, time, and trouble are bound to change dramatically as work progresses. The construction team itself may be volatile and problematic. But the directors and top management of the construction company should identify, analyse, and rationally control these risks.

On daily basis a project manager or a respective department manager either explains why the projects runs over the set budget and/or there is a delay. It is incredibly rare when even part of the blame is attributed to the reporter. Usually totally the opposite is the case. There are at least ten reasons why the project is over-spent and delayed, due to reasons not attributable to one person. As was mentioned, the complexity of the projects does not allow to supervise project on daily basis. There should be a control system, but when problem rises to the board, getting deep into details is necessary. If the person never led project on the site, it is almost impossible. The story will be told in very coherent way, while one only person with nonstandard thinking and real experience may turn the fairy tale of innocence into the real picture. This is highly important. The issues that board discusses usually have big financial impact and potentially may end up in court. Thus, before the final decision to start litigation is made, the board and lawyers should know the truth. When project manager knows that he talks to a professional, especially taking into account certain engineering arrogance, he/she would not lie, but will try to be as close as possible to the reality. Of course, there is always an option to hire independent consultant to investigate the issue, but it is expensive, and often there is no time for long investigations. Common practice for a project manager is to tell why he did not succeed, but very few of them may list the actions they took and solutions they squeezed in order to succeed. It is crucial to have laterally thinking staff with different background in the board, but one should never reduce the importance of real construction experience and knowledge.

Thus, the general management apart the strategy, corporate governance and organizational behaviour should pay great attention to the issue of leadership and fair attitude between superiors and subordinates.

In the face of its size and universality, construction industry is often cited as plagued with graft and malpractices. Common issues highlighted were tendering practice, sub-standard quality of construction work, safety culture, payment woes, corruption and most

importantly, public accountability for money spent on public buildings and infrastructure. Motzko et al (Motzko et al, 2013) stated that construction contractors have a reputation for unethical behaviour, such behaviour roots in big greed that is one of the leading factors to unethical behaviour. Filippi (Filippi, 2010) extends unethical behaviour to some criminal issues that industry players are facing. However, this research does not deal with any illegal activities that are forbidden by law and should not be carried out in any manner. It is important to underline that all participants should avoid these practices. Unfortunately, such terms as cartel collusions, bribery, kickbacks and fraud are often linked to the construction sector.

Being dependent on the state or municipal customers, contractors may wish to get the contracts using forbidden techniques. In order to avoid it, the company should develop and maintain the code of conduct and ethics.

All international large scale and most of midsize construction companies do have such codes conduct. More so, it is obligatory to all partners and subcontractors they are working with. One of the world leading construction companies Spanish FCC set it as following:

- The Code of Ethics, standard senior of FCC sets out guidelines for the conduct expected of our professionals in their actions and behaviour in **ethical, social** and **environmental** matters. -It applies in all the countries we work in, and covers all FCC's **employees, managers, suppliers and contractors**.
- The Code of Ethics also strengthens the corporate culture of the organization, having been drawn up with the purpose of unifying and reinforcing the company's identity, culture and guidelines for conduct. (Code of Ethics (2022) [online]. FCC Construction).

Other companies maintain similar approach. Even though these limitations contradict with agility principles, these are the red lines that any company should not cross. It is not just a moral principle to say stealing is bad. It is pure business. Today, in era of digitalization and transparency, it becomes harder and harder to hide things or to act in shadow. The transnational investigations, anti-money laundry activities of the law-enforcement authorities unveil most of the “deals”. Putting aside the criminal penalties to the officials, let’s discuss what happens to the company. First of all, there cases and states where criminal case may be issued against the entity as well. Criminal record (in cases related to the core business mainly financial crimes or cartel collusion) of an entity or its top-level officials leads to automatic exclusion of the organization from the state or municipal tenders. In case of pure

infrastructure construction companies it may lead to insolvency. Second high penalties in case of cartel collusion usually calculated as a per cent out of turnover resulting in heavy financial repercussions. Third are reputational risks when bank and other institutional clients and stakeholders may refuse to work with the organization, that leads to additional losses and sometimes, for instance in case of inability to get guarantee or credit lines, even might force the company to declare bankruptcy. Finally, costs, energy and other resources spent on reorganization, legal support and advisory needed for company's protection cause additional losses, but what is even more important, do not allow company to develop, this results in losing its market share and worsening financial situation. Thus, in a long term the negative impact of such actions will always outweigh the short-term gain.

Leading the construction company is not easy. Construction sector is tough, fragmented, and full of conflicts, as any sector where big money is involved. The top management must root and maintain the crucial idea of fair approach to every stakeholder. The construction sector is known for its peculiar and not always fair practices. The name of the game usually is money. According to Njie et al (Njie et al., 2005) the nature of the industry is such that generally the project construction team prefinances the project and then relies on being reimbursed for the works to progress diligently. Unfortunately, though, many main contractors have faced severe financial difficulties when their source of cash flow to execute contracts slows down, and even in some cases, ceases altogether. Subcontractors and suppliers are often at the mercy of their main contractors who sometimes refuse to release their payments accordingly. The lack of money in the industry is aggravated by the lack of trust amongst supply chain players.

This lack of trust means that all parties involved in the construction process behave in very cautious way. According to Pinto et al (Pinto et al., 2009) the lack of trust between construction project participants has been identified as one of the main factors that lead to unsuccessful completion of construction projects.

On the daily basis the client uses its dominating position, contractor uses legal hooks to claim additional money for the works that had to be included from the beginning, subcontractors blackmail general contractor by leaving the site at the crucial construction point, unless their demands are not fulfilled, networks providers suddenly require repair of additional volumes, not related to the project, otherwise the object will not be accepted and so on. Such behaviour should be avoided. It does not mean that Contractor should not protect

himself, it needs to be done. The honestly done and earned additional works need to be remunerated, but there are a lot of doubtful common practices that evolve into counterreaction from the vis-à-vis turning almost each construction project to the battlefield. There were, are and will be disputes that is why the contracts are being signed to regulate the relationship of the parties, but there will always be grey areas or verbal agreements that were not included in the contract or protocol that promising party refuses to fulfil or money claims – these are bad practices. The scale and number of personnel involved in the construction process very often do not allow to formalize everything the parties agree during the meetings, but some works have to be done immediately in order not to harm the project. In such cases, the mutual trust may save the project, but trust is something that is earned and proved by many instances, which can be destroyed by one inaccurate action. “Trust cannot be treated as a commodity; it should be treated as a set of moral values that should be incorporated in the inner of a human being as main drivers to change distrust into trust among construction players.” (Soares, 2012).

As already discussed, the organization operates in very dynamic environments, while its management at all levels should solve comprehensive situations. The ability to think out of the box, to analyse and review problems or solutions from different angles is highly appreciated for any employee, but it is a must for the top managers. The guideline of how top managers should adopt for themselves and deploy within the organization is described by the pattern of the ***“corporate self-questioning”***. The fig 3.26 illustrates how the infinite circulation of the “corporate self-questioning” during the decision making should be done. Lafey & Martin (Lafey & Martin, 2013) developed the “cascade” to show how the strategy should be developed and set, while the main “customers” of the “cascade” are the top managers who are expected to be broad thinking and advanced persons by default. Martin (Martin, 2017) claims that “these choices are a critical part of the integrated set of five choices that are necessary to successfully guide the actions of an organization”.

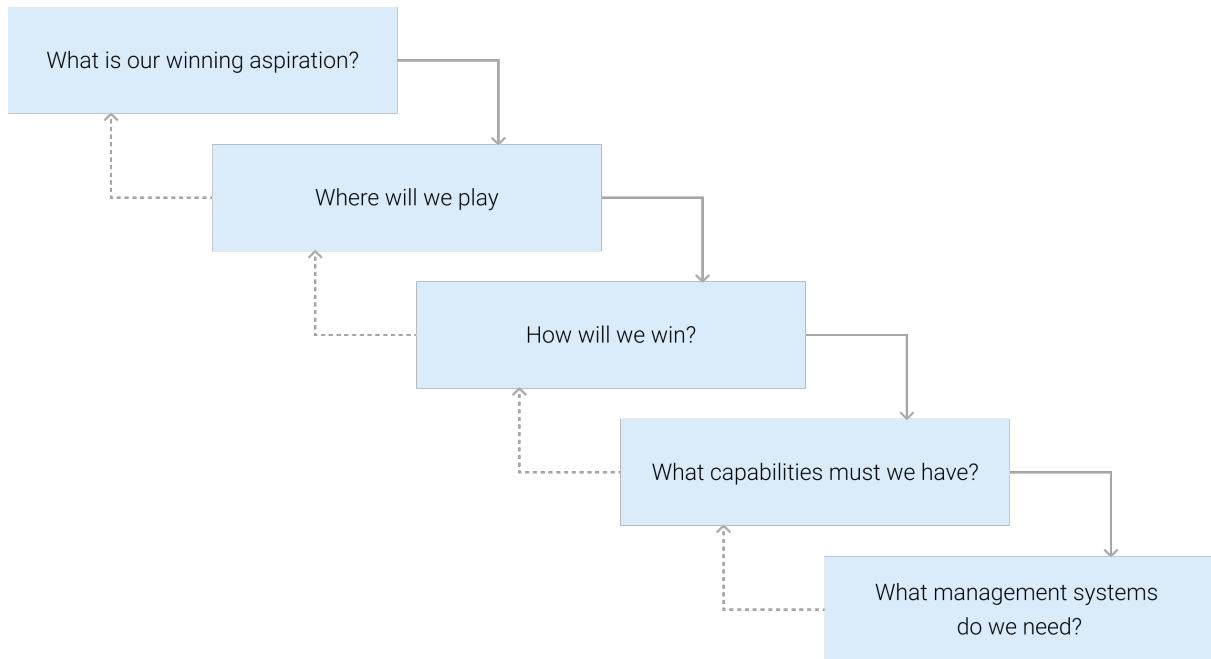


Figure 3.27 Cascading choices' model adapted from Lafey & Martin (Lafey & Martin, 2013)

Author suggests using this model on a broader scale and not limited to the top level. Each employee should and can guide him/her self by this model, while he/she making any important decision. Bearing these components in mind the company's top management should build the respective structure, develop flexible policies and to apply agile practices. The corporate agility should become the DNA of corporate strategy and daily operation. Thus, deployment of the corporate agility will require to evaluate its effect to the whole organization, its activities and structure.

Summarizing the chapter 3.5 author would like to outline that corporate agility lies in the field of broad and creative thinking, cooperation and analysis, open communication, and flat structure. The term manager should be synonym to the term "leader". The innovation and non-standard ideas should be voiced with no fear, but more importantly they should be heard as well. There is no particular department or activity that play a bigger or more important role for turning a construction company to a more agile one. Each department, team or group should do its best, yet it is important to remember agility should never be a reason for bypassing legal requirements, allowing technological violations, or abusing humans. Nevertheless, the organizational practices discussed under support and primary activities all together with organizational behaviour, strategy, corporate governance, leadership, and general management will play a main role in shaping corporate agility of the company, comparing to technological processes and approaches that cannot be changed. When

implementing corporate agility, first the idea and approach should be communicated and discussed, the processes and procedures are less important and will follow. People should release themselves from old-fashioned thinking and get into the wave of questioning and idea generating.

The following chapter will discuss factors that affect corporate agility of the construction company.

a. Determination of the factors affecting corporate agility of the construction company

Following the findings discussed in current and previous chapters, author conducted interviews with construction industry's experts.

The following guidelines and limitations have been set for the research:

The aim of the research: to identify major factors that affect corporate agility of a construction company through interviews with industry's professionals.

Factors that affect corporate agility in the construction industry

In order to identify factors that affect corporate agility author conducted interviews (face to face or via conference calls) with 15 CEOs, CFOs, CLOs, Construction and HR directors, senior project managers from several countries and 11 construction companies. The participants were asked to list at least five factors that affect corporate agility of their company. 84 factors were identified and discussed with experts. The content analysis approach was used to determinate major factors that affect corporate agility of a construction company. The collected data was organized in broader groups and resulted in 8 key factors that affect corporate agility. Each factor has its weight of importance influencing corporate agility. The summarizing table can be found in Appendix 15.

Table 3.14

The weight of the major factors that affect corporate agility*

#	Major factors that affect corporate agility	No of answers	% of the total
1	2	3	4
1	Structure (hierarchy, bureaucracy, procedures, past experience)	21	25%

Table 3.14 Continued

1	2	3	4
2	Human Resources (broad thinking, motivation, skilled workforce)	19	22,6%
3	Management	12	14,3%
4	Planning (including use of technologies and analytics)	10	11,9%
5	Communication (internal, external, reputation)	8	9,5%
6	Lack of strategy/vision	7	8,3%
7	Financial	4	4,8%
8	Influence of PESTEL factors	3	3,6%
	total	84	100%

*source: interviews performed by Author

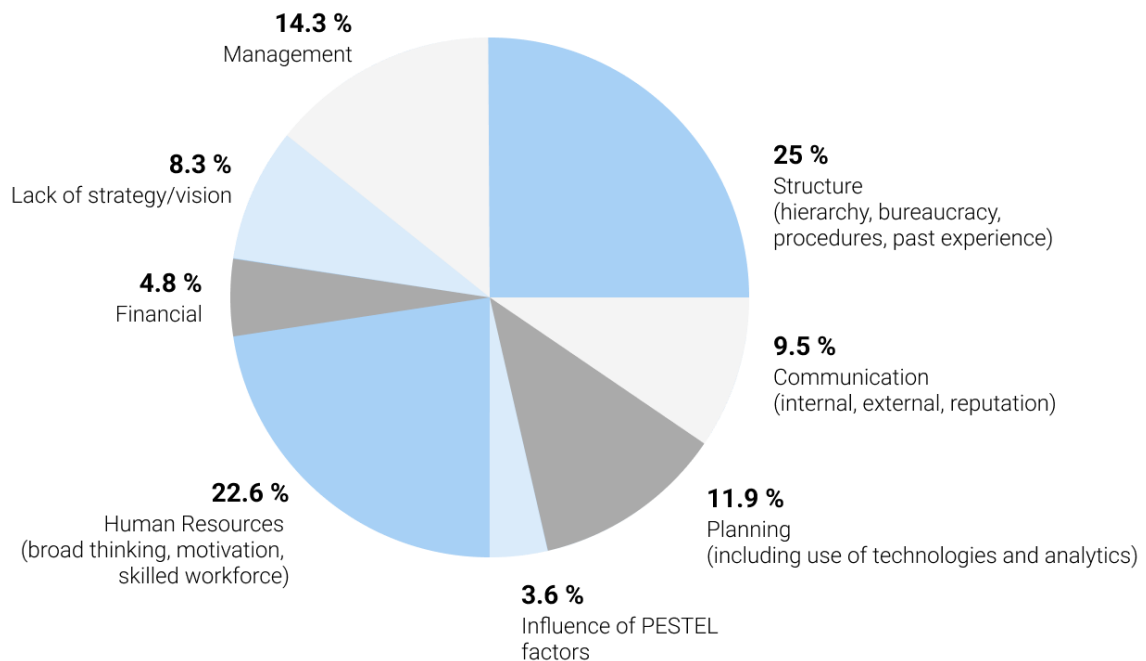


Figure 3.28 The visualization of the shares of the major factors' affecting corporate agility source: interviews performed by Author.

The author reviewed these factors in details as following:

- **Poor structure** (hierarchy, bureaucracy, procedures, past experience) – the interviewed managers have attributed the biggest share to this factor. They asserted that poor organizational structure, unclear hierarchy and chain of command, overall unnecessary bureaucracy, shareholders interference in the operational process, historically routed approaches do not allow the company to respond to the changes flexibly and properly. Furthermore, even if a threat or a change is timely detected, the reaction time appears to be too long and necessary resources are too expensive.

- **Human Resources** (broad thinking, motivation, skilled workforce) – the next factor that was granted the second place with almost a quarter of the influence share is human capital quality. All respondents agreed that construction industry struggles from the lack of broad-mindedly thinking, motivated professionals at all levels. This, in turn, leads to the delays in project delivery terms, losses due to the poorly performed work, and prioritizing own goals over the ones of the project or the organization.
- **Poor management** – is directly related to the quality of human capital. The lack of Leadership by Example, pessimism at the top management, inability to inspire employees and involvement of top management in the daily operational decision-making leads to chaos and feeling of running through the forest instead of driving on the paved road. The gap between managerial strata and mid and low-level employees re-enforce the inability of the company to qualitatively operate and timely detect threats and opportunities.
- **Poor planning** (including the use of technologies and analytics) – is an explicit problem of the construction industry. The construction organizations very often lose money implementing highly complicated projects where significant resources are required due to the lack of operational planning. Failure to meet deadlines, late orders, improper information flow, poor risk management, lack of assisting tools (for instance, suitable software), missing the ‘point of no return’ result in the mistakes/defects being eliminated with great effort and resource investment. Such short-term planning and pumping out water out of the ship, only allows to keep ship afloat, but it is not capable to navigate it to the final destination.
- **Communication** (internal, external, reputation) – is also an important factor with the share of 10%. People highly appreciate the reputation of the company, and its communication with external stakeholders. However, poor internal/cross-departmental exchange of information, insufficient information to make decisions, and lack of feedback demotivates employees.
- **Lack of strategy/vision** – Predominantly detected at the top management level. The lack of understanding of the goals, the inability of thinking “outside the box”, failure of the core top management team/committee to set strategy do not allow a company to develop, and as a result, when nobody knows where they are going,

nobody knows what to expect and what to be prepared for. Such situation leads to demotivation, and disarray within the company.

- **Financial** – the next to last factor that was detected since no construction company can operate without strong financial background (credit and guarantee lines, working capital etc.). However, it was discussed more as a given source that allows the company to develop and properly react to the changes. It is good to have limitless funds. However, often the companies with “deep pockets”, are reluctant to act in a proactive and agile way.
- **Influence of PESTEL factors** – influence of Political, Economic, Social, Technological, Environmental and Legal macro-external factors was detected as one that has little impact on agility of the company. Construction is one of the most bureaucratized industries, thus all these external factors are perceived as more or less given, and company should operate with maximum agility within these limits. The important issue to be discovered is whether these factors change too frequently or too quickly, meaning that such dynamic change has a negative effect on an organization as it is not able to adjust accordingly in a timely manner.

As is evident all major factors correspond with the findings discussed in the previous chapters.

It is important to highlight that almost half (48 percent) of influence on the agility of the company are attributable to only two factors – human resources and structure, further 36 percent were contributed by management, planning and communication.

Author converted these factors into the conceptions discussed above and found that these would become human capital, corporate governance and organizational behaviour, meaning the three components make up 84 percent share of the influence on the corporate agility. The importance of these factors was proven by both theoretical and practical approaches. Further research will focus on creation of the tool that will allow to detect the level of corporate agility and to provide the guidelines for its improvement.

Concluding this chapter, author would like to highlight that by improving the factors determined in the previous chapter, one will improve the corporate climate and corporate agility, which in turn will increase the feeling of satisfaction among employees. The top and mid-level management of the entity should coordinate and motivate the personnel in such a manner that each and every person, team, department or division would be always ready to

change and/or challenge, would chase improvements and exercise broad thinking, while the whole organization has a deep understanding and is being guided by the corporate goals and values. The corporate agility should become ***consciousness of the organization***.

There are few bullet points summarizing the tasks the construction company's management should to implement to enhance corporate agility:

- The road map, sub-goals and goal to be set and communicated;
- The strategy has to be clear and simple for understanding, with no sophisticated documents and schemes;
- The sub-goals and road map should be defined, reviewed and adjusted within relatively short periods of time;
- The cross-section points of different activities should be reviewed. It is important to determinate the supplemental and controversial goals and actions.
- Corporate guiding values to be defined;
- The corporate agility should be integrated in both the "heads", and on "paper";
- The internal procedures have to be reviewed and adjusted periodically, involving the representatives of the teams using respecting
- Corporate governance should fit the approach of corporate agility;
- Organizational structure and behaviour should fit the approach of corporate agility;
- Leadership, human capital development and interpersonal relationship should be prioritized;
- Policy of corporate self-questioning should be maintained;
- Support and primary activities to be controlled and supervised, with broad delegated implementation rights;
- Knowledge sharing and communication should be trained and developed;
- Alignment of personal goals with corporate goals should continually occur;
- Cultural aspects should be promoted and taken into account if relevant;
- The resistance to change should be minimized. The change should be perceived as part of the daily life;
- Total avoidance of any discrimination or any illegal actions.

Summarizing the problems and challenges of agility in support and primary activities, strategy, general management, corporate governance and organizational behaviour, in light

of determined factors that affect corporate agility of the construction company, author would like to signify the importance of balance and common sense implementing any organizational change. Rapidly changing environment, internal challenges, limitations set by peculiarities of particular industry or market, cultural clashes, etc. – these should be evaluated and chaos should be avoided. , Both empiric and academic studies prove that substantial changes in the way the organizations being managed and led are essential. Modern people do not accept anything but momentary response to their needs and this trend will progress. Easy access to information, data, geographical places, resources, globalization of the business made a switch in minds of the all human beings of all generations, races and profession backgrounds. The agility from both personal and corporate perspectives became a matter of survival, the next level of evolution. The next chapter will deal with **Development of the Methodological Approach for the Determination and Improvement of Corporate Agility's Level within a Construction Company.**

4. Development of the Methodological Approach for the Determination and Improvement of the Corporate Agility's Level within a Construction Company

Following the findings discussed in previous chapters, the author decided to develop a methodological approach for determination and improvement of corporate agility level (henceforth – Methodological approach) within a construction companies.

Methodological approach is the systematic method to resolve a problem. For this purpose, all companies should start with data gathering - to understand current situation and then, by application of various managerial techniques move towards strategic aim of the company.

Methodological approach includes:

1. **Theoretical background of overall approach:** Change of corporate governance, company's organizational behaviour, operational and strategic approaches etc., towards corporate agility is based on change in management.
2. **Steps (A.G.I.L.I.T.Y. concept):**
 - **Identification of current state-of-affairs of the company:** questionnaire, based on different management theories and approaches;
 - **Identification of the elements to be improved and/or changed;**
 - **Creating a plan;**
 - **Implementation of change;**
 - **Collecting data to analyse the results;**
 - **Monitoring.**

Methodological approach should be implemented as an ongoing activity and it is recommended to repeat data collection sequentially, for example, two times a year.

Detailed explanation of Methodological approach is illustrated in figure 4.1.

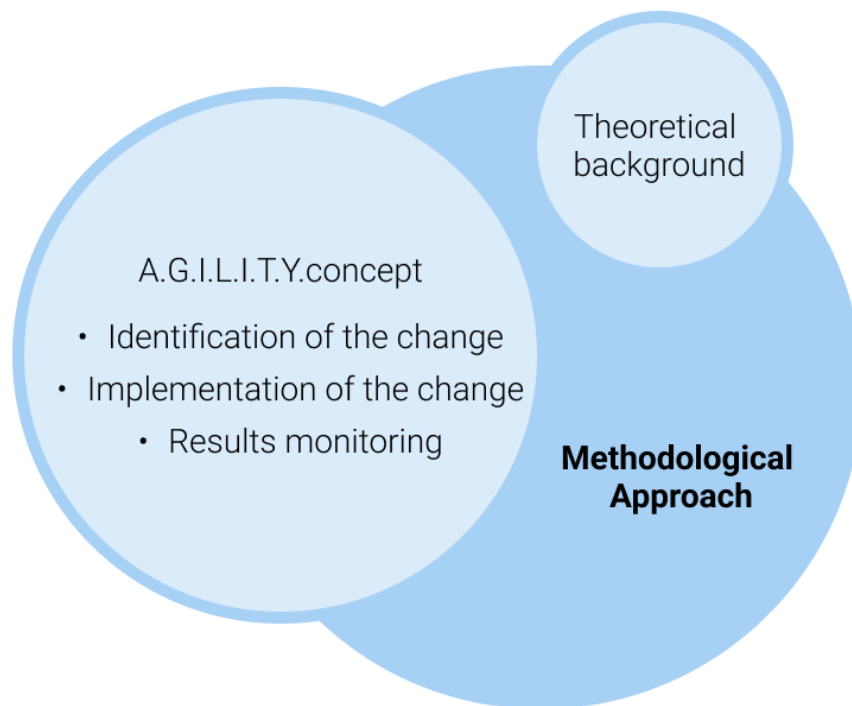


Figure 4.1 Methodological approach basic elements developed by author.

Data gathering and analysis could be done using different tools, techniques and approaches but as most appropriate for evaluation of the corporate agility level of the company, the questionnaire followed by interviews would fit best.

Methodological approach developed by the author should assist the company to identify its weaknesses from corporate agility point of view and provide guidelines for improvement of these weaknesses. It is based on both theoretical and practical findings. As it was discussed in the previous chapters “corporate agility” of the construction company is shaped by cultural aspects, organizational behaviour, corporate governance, strategy, and human capital, among other factors. As was already proved, there is a demand for the corporate agility within the construction industry, and improvement of corporate agility has a great positive effect on the performance of the company, on its ability to react and adjust itself, capability to respond to internal and external challenges with minimal resources. In practice, a company should use Methodological approach periodically not only to identify, but also to monitor changes over time.

4.1. Methodological Approach and it's Implementation

Theoretical background

Based on in-depth study of change in management approaches (Kotters Change Management Theory, Lewin's change management model, Nudge theory, etc.) author has decided to use Burnes (Burnes, 2017) recent studies and author's personal experience as a founder and a board member of a large international construction company to substantiate the way the change should be implemented (see step "Years" for the details).

A.G.I.L.I.T.Y. concept.

As a fundamental part of Methodological approach author has developed the seven-step A.G.I.L.I.T.Y. concept of performance valuation of the construction organization, its analysis and development of the recommendations for change implementation and result monitoring as shown in figure 4.2 and Appendix 16.



Figure 4.2 The seven-step A.G.I.L.I.T.Y. concept as a fundamental approach for Methodological approach developed by Author

“A” (Agent) – as soon as the company decides to apply Methodological approach to the company the process of implementation of A.G.I.L.I.T.Y. concept could be started. To implement any changes the organization needs the change agent. **This should be a person who promotes, supports and implements new way of governance in the organization.** So, the first step is to choose an independent Agent. It is highly recommended to hire an external consultant who is a professional from the construction industry but has no personal involvement in the valuated company. The specialist should be honest and reputable, employees have to trust that their personal data shall not be disclosed and would be more inclined to answer questions honestly. If, due to any reason a company will decide to perform this valuation using internal resources, its management should think well how to convince employees to provide true data. One of the options might be cross-department valuation when head of one department works with employees of another department, but still this approach does not exclude conflict of interests and similar divergences.

“G” (Guidance) – All changes need to be guided. The **Agent** becomes the **Guide**. He/she should explain whole procedure and the questionnaire. Guiding communication is one of the most important phases that cannot be skipped. It allows to develop the feelings of belongingness and involvement among the employees. Also, the communication within the whole process is in hands of the Agent. At the same time, the Agent/Guide should continuously control the process and communicate the **need for** the process within the company. The process should be as transparent as possible. Everybody should understand why it is being done, what are the expected outcome, and that management really means it. The background can be explained, the strategic goals discovered, some failures or weaknesses mentioned, but the spirit or will to grow and to develop has to prevail. Clear tasks, rules and limits must be set and communicated. All should believe in good faith and confidentiality of this process. Going through all questions and explaining them together with valuation criteria will help to ensure the understanding of what is required. The post-filling process also should be discussed. Questioning and involvement should be promoted. However, it should not turn into prosecutor’s questioning. It can be implemented either in person, or via video conference, less recommended via written instructions. The latter may compliment the visual component. It is important to highlight that people may use the remark field in case they do not know something or would like to expand the answer.

“I” (Information gathering) - The first step is application for the questionnaire within the company. While implementing the questionnaire, try to get as many participants as possible. The person should fill his/her answers by giving numbers and levelling his/her agreement or disagreement with the description. The questionnaire should be filled by as many employees as possible from all levels and departments. It is recommended not ask to fill questionnaire by hand, because people will be weary of identification. It is best to provide a platform where no personal identification is required, and request for identification is set as optional. It can be done simultaneously or by groups, via smartphones or laptops, within limited period. The questionnaire shall assist in discovering the real situation of the company and all its functions, relationship among colleagues and different departments, the perceptions of subordinates about superiors, and employees about organizations. It will also explore the level of corporate agility of the company and much more. In other words, it will include great deal sensitive data, which most of the employees will not be willing to openly share, especially with the top managers of the company. There might a be variety of reasons for why they would behave that way, either due to fear of losing their job, or peculiarities of their nature, but crucial point of any valuation, analysis, conclusions, and further improvement program is the true and reliable data received during the initial phase.

Following the previous findings, the author has designed a questionnaire (see table 4.1 for the list of questions and academic source references, and Appendix 17 for the full version of the questionnaire) in order to detect the level of corporate agility in the company.

The questionnaire’s blocks are based on the factors that affect the corporate agility of the construction industry as were determined in chapter three.

The questionnaire was developed based on following theories presented in previous chapters of this work:

- Cultural aspects according to the finding of G. Hofstede;
- Best practices of corporate governance frameworks;
- Best practices of organizational behaviour frameworks;
- The Contingency theory;
- The Expectancy theory;
- Maslow’s Theory of Human Motivation;

- The Bureaucracy theory;
- Corporate lifecycle findings developed by Dr. Ichak Adizes;
- Interviews with construction industry representatives.

This questionnaire consists of nine blocks (see table 4.1 and Appendix 17) based on the factors affecting corporate agility determined in chapter three. Such structure allows to perform more detailed analysis of the results, systematize the approach, and allows at more accurate implementation:

- 1st block, questions 1-10 – Human resources;
- 2nd block, questions 11-17 – Communication including reputation;
- 3rd block, questions 18-22 – Operational planning and approach;
- 4th block, questions 23-30 – Management and Organizational behaviour;
- 5th block, questions 31-39 – Structure and Corporate governance;
- 6th block, questions 40-46 – Strategy and Values;
- 7th block, questions 47-57 – Financial data;
- 8th block, questions 58-63– Influence of PESTEL factors (political, economic, social, technological, environmental, legal – external macro factors);
- 9th block, questions 64-68 – General valuation.

Overall approach to the questionnaire is to evaluate each question on the scale from 1 to 10. The closer the response value is to '1', the more agile company is. The value "1" corresponds with the level of agility of start-ups at the garage level, where small teams quickly switch from task to task, and everybody is doing everything. The construction company by default cannot operate at such level, since the industry regulations introduce the minimal level of bureaucracy that even small construction company cannot ignore. The optimum value mid-size or large construction company should aim at is "5", while the small construction companies should aim at "3". Such figure provides a balance between the necessary limitations (external regulations and internal bureaucracy) and the ability of the company to quickly react and reorganize itself in case of internal and external challenges.

Table 4.1

The Questionnaire's structure and theoretical background of all topics

#	Factors affecting corporate agility	Source of reference ⁴
1	2	3
Human Resources		
1	Ignorance of personnel (needs, suggestions, aims etc.)	Eaton (2008); Ritz (1994); Weber (1948); Adizes (2014); McGregor (1960); Friberg & Eldring (2013); Eldring et al. 2012; Mayo 1933; Brooks & Spillane (2016)
2	Impersonal relationship	Eaton (2008); Sarker & Khan (2013); McAuley et al. (2007); Siew (2014); Dischner (2015); Mayo (1933)
3	Training and studying	Nerur et al. (2005); McGregor (1960); Vroom & Deci (1977); DeWitt et al., (2005); Eaton (2008); Ritz (1994); Oberlender (2000); Mayo (1933)
4	Employees' valuation scheme	Eaton (2008); Vroom (1964); Weber (1946); Kondalkar (2007); Siew (2014); Dischner (2015); Mayo (1933)
5	Complexity of testing procedures for the employees	Eaton (2008); Wagner III & Hollenbeck (2010); Kondalkar (2007); Siew (2014)
6	Implementation of employees' ideas/opinions	Kondalkar (2007); Hofstede (2011); Eaton (2008); Siew (2014); Oberlender (2000); Brooks & Spillane (2016)
7	Alignment of employee's personal goals and corporate goals	Dan-Asabe & Radosavljevic (2009); Maslow (1943); Eaton (2008); Vroom (1964); Burns, & Stalker (1961); Siew (2014); Oberlender (2000)
8	Trust in direct manager	Wagner III & Hollenbeck (2010); Maslow (1943); Kast & Rosenweing (1979); Brockmann and Girmscheid (2010); Ritz (1994)
9	Clear career tracks for employees	Siew (2014); McAuley et al. (2007); M. Weber (1948); Mintzberg (1979); Stevens (2007); Friberg & Eldring (2013); Eaton (2008); Dischner (2015)
10	Previously agreed remuneration/penalties	Siew (2014); Friedrich (1952); Dischner (2015); Mintzberg (1979); Stevens (2007); Friberg & Eldring (2013); Eaton (2008)
Communication incl. reputation		
11	General reputation of the company	Wagner III & Hollenbeck (2010); Shockley-Zalaback (1991); Mintzberg (1979); DeWitt et al. (2005)
12	Open and frank internal communication	Cappelli and Tavis (2018); Shockley-Zalaback (1991); Friedrich (1952); Ritz (1994); Mayo (1933)
13	Open and frank external communication with clients, subcontractors and stakeholders	Cappelli and Tavis (2018); Shockley-Zalaback (1991); Friedrich (1952); Nunnally (2007); Ritz (1994); Oberlender (2000)
14	Tolerance of discrimination on any basis (race, gender, sexual, cultural, religious or political background)	Wagner III & Hollenbeck (2010); Maslow (1943); Kondalkar (2007); Mintzberg (1979)
15	Level of trust and openness between company and its employees	Benheim and Birchall (1999); Hofstede (2011); Brockmann and Girmscheid (2010); Tuutti (2005); Friedrich (1952); Ritz (1994)

⁴ For the details of authors and publications please see the list of bibliography

Table 4.1 Continued

1	2	3
16	Level of trust and openness between company and its clients, subcontractors and stakeholders	Benheim and Birchall (1999); Hofstede (2011); Brockmann and Girmscheid (2010); Tuutti (2005); Ritz (1994)
17	Involvement in charity activities	Maslow (1943); Wagner III & Hollenbeck (2010); Kondalkar (2007); Mintzberg (1979)
Operational planning and approach		
18	Professional approach of the company	Ritz (1994); Ling et al. (2005); Duckworth (2016); Kang et al. (2006); Adizes (2014); DeWitt et al. (2005)
19	Professional level of my department/team	Ritz (1994); Ling et al. (2005); Duckworth (2016); Kang et al. (2006); Barbosa et al. (2017); DeWitt et al. (2005)
20	Level of paperwork (reports, inquiries, explanation notes etc.)	M. Weber (1948); Adizes (2014); Barbosa et al. (2017); DeWitt et al. (2005)
21	Operation according to previously set plans and forecasts	Ritz (1994); Burnes (2017); Adizes (2014); Burns & Stalker (1961); Barbosa et al. (2017); DeWitt et al. (2005)
22	Your superior plans the work ahead, evaluating few potential scenarios	Ritz (1994); Burnes (2017); Porter (1987); Burns & Stalker (1961); DeWitt et al. (2005); Barbosa et al. (2017)
Management and Organizational behaviour		
23	Resistance to change	Burnes (2017); DeWitt et al. (2005); Wagner III & Hollenbeck (2010); Mintzberg (1979); Adizes (2014); Kondalkar (2007)
24	Time needed to make a decision	Burnes (2017); Adizes (2014); Wagner III & Hollenbeck (2010); Kondalkar (2007); Ritz (1994); Eaton (2008)
25	Internal focus – minimization of external interruption	Adizes (2003); de Waal & Martiz (2019); Sennett (2006); Nunnally (2007); Weber (1948)
26	Time needed to implement a decision/change	Burnes (2017); Adizes (2014); DeWitt et al. (2005) Wagner III & Hollenbeck (2010); Mintzberg (1979). Adizes (2014); Kondalkar (2007)
27	Level of internal inertia	DeWitt et al. (2005); Burnes (2017); Adizes (2014); Wagner III & Hollenbeck (2010); Mintzberg (1979); Kondalkar (2007); Eaton (2008)
28	Cooperation between departments and mutual assistance	De Weerd et al. (2020); Brockmann and Girmscheid (2010); DeWitt et al. (2005) Ritz (1994); Eaton (2008)
29	Consequences of quick implementation of decisions/changes	Eaton (2008); Burnes (2017); Adizes (2014); DeWitt et al. (2005); Kähkönen & Sexton (2005)
30	Focus on corporate command-control system	Weber (1948); Adizes (2014); Hull (2012); Sennett (2006); Ritz (1994); Eaton (2008)
Structure and Corporate governance		
31	Structured corporate governance (owners' control and supervision of the management)	Maasen (2002) Parsons (1951); Weber (1946); Hull (2012); Langford & Male (2001)

Table 4.1 Continued

1	2	3
32	Clear and transparent operational scheme	Parsons (1951); Weber (1946); Sheridan and Kendall (1992); Kähkönen & Sexton (2005); Langford & Male (2001)
33	Division of labour	Sarker&Khan (2013); Adler et al. (1999); Eldring et al. (2012); Oberlender (2000); Weber (1948);
34	Clear hierarchical authority structure	Burnes (2017); Adizes (2014); McGinn (2017); Adler et al. (1999); Oberlender (2000); Eaton (2008)
35	Formal and unbiased procedures (detailed rules and regulation)	Van der Voet (2014); Epstein & O'Halloran (1999); Adler et al. (1999); Oberlender (2000); DeWitt (2005); Kähkönen & Sexton (2005)
36	Existence of informal procedures (parallel to formal ones)	Van der Voet (2014); Epstein & O'Halloran (1999); Adler et al. (1999); Eaton (2008)
37	Effectiveness of informal procedures vs formal procedures	Adizes (2014); Epstein & O'Halloran (1999); Adler et al (1999); Eaton (2008)
38	Division according to functions	McAuley et al. (2007); Adler et al. (1999); Ritz (1994); Eaton (2008); Oberlender (2000)
39	Clear definition of duties and definition of level of autonomy.	McAuley et al. (2007); Adler et al. (1999); Ritz (1994); Eaton (2008); Oberlender (2000)
Strategy and Values		
40	Correspondence of corporate values to company's behaviour.	Duckworth (2016); Fehlau and Stock (2012); Soares (2012); Mintzberg et al. (2006); Porter (1996), Langford & Male (2001)
41	Employees' acceptance of the corporate values and behaviour according to.	Duckworth (2016); Fehlau and Stock (2012); Soares (2012); Mintzberg et al. (2006); Langford & Male (2001)
42	Dependence on one/few major clients	Kähkönen & Sexton (2005); Mintzberg et al. (2006); DeWitt et al. (2005); Oberlender (2000); Construction Blueprint consortium / FLC report (2020); Langford & Male (2001)
43	Dependence on the State/municipal clients	Kähkönen & Sexton (2005); DeWitt et al. (2005) Oberlender (2000); Construction Blueprint consortium / FLC report (2020); Langford & Male (2001)
44	Company's midterm goals understanding by the employees.	Porter (1996); Whittington (2001); Rumelt (2011); Vroom (1964); Mintzberg et al. (2006); Oberlender (2000); Stevens (2007); Langford & Male (2001)
45	Company's long-term goals understanding by the employees.	Porter (1996); Whittington (2001); Rumelt (2011); Vroom (1964); Mintzberg et al. (2006); Oberlender (2000); Stevens (2007) Langford & Male (2001)
46	Employees understanding of the company's goals achieving strategy.	Porter (1996); Whittington (2001); Rumelt (2011); Vroom (1964); Mintzberg et al. (2006); Oberlender (2000); Stevens (2007); Langford & Male (2001)
Financial data		
47	Turnover of the company	Šiškina et al. (2009); Rajasekhar (2017); Martin (2017); Stevens (2007); Nunnally (2007)
48	Number of employees	Rajasekhar (2017); Stevens (2007); Šiškina et al. (2009); Nunnally (2007); Martin (2017)

Table 4.1 Continued

1	2	3
49	Dependence on the own workforce (“blue collars”)	Carpenter (2001); Rajasekhar (2017); Martin (2017); Stevens (2007); Nunnally (2007); Šiškina et al. (2009); Parada (2020); Langford & Male (2001)
50	Operation on several international markets	Barbosa et al. (2017); Rajasekhar (2017); Stevens (2007); Nunnally (2007); Parada (2020); Langford & Male (2001)
51	The biggest market’s share in the turnover	Rajasekhar (2017); Stevens (2007); DeWitt et al. (2005); Construction Blueprint consortium / FLC report (2020); Langford & Male (2001)
52	The biggest profit’s share per market out of total profit	Rajasekhar (2017); Kähkönen & Sexton (2005); Motzko et al. (2013); Stevens (2007); Construction Blueprint consortium / FLC report (2020); Parada (2020)
53	Dependence on borrowed capital/leverage of the company	Rajasekhar (2017); Kähkönen & Sexton (2005); Motzko et al. (2013); Stevens (2007); Parada (2020)
54	Dependence on bank guarantees/credit lines	Stevens (2007); Kähkönen & Sexton (2005); Motzko et al. (2013); Parada (2020)
55	Lack of working capital	Stevens (2007); Carpenter (2001); Kähkönen & Sexton (2005); Motzko et al. (2013); Parada (2020)
56	Negative annual cash flow	Stevens (2007); Carpenter (2001); Kähkönen & Sexton (2005); Motzko et al. (2013)
57	Financial loses in last 3 year	Stevens (2007); Kähkönen & Sexton (2005); Motzko et al. (2013); Parada (2020)
Influence of PESTEL factors (external macro-economic political, economic, social, technological, environmental and legal factors)		
58	POLITICAL changes frequency occurrence and their influence on your company.	Barbosa et al. (2017); Stevens (2007); Nunnally (2007); Kähkönen & Sexton (2005); Kast and Rosenweing (1979); Cooper and Burrell (1988); Construction Blueprint consortium / FLC report (2020); Friberg & Eldring (2013); Parada (2020); Langford & Male (2001)
59	ECONOMIC changes frequency occurrence and their influence on your company.	
60	SOCIAL changes frequency occurrence and their influence on your company.	
61	TECHNOLOGICAL changes frequency occurrence and their influence on your company.	
62	ENVIRONMENTAL changes frequency occurrence and their influence on your company.	
63	LEGAL changes frequency occurrence and their influence on your company.	
General valuation		
64	Overall organizational behaviour	Wagner III & Hollenbeck (2010); Kondalkar (2007); McGregor (1960); Vroom & Deci (1977); Langford & Male (2001)
65	Overall organizational stability and development	Wagner III & Hollenbeck (2010); Kondalkar (2007); McGregor (1960); Vroom & Deci (1977)
66	Overall level of bureaucracy	M. Weber (1948); Adizes (2014); DeWitt et al. (2005); Langford & Male (2001)

Table 4.1 Continued

1	2	3
67	Employees' overall level of satisfaction	Maslow (1943); Vroom (1964); Adizes (2014); McGregor (1960); Vroom & Deci (1977); Cardoso et al. (2015); Eaton (2008)
68	Individual level of satisfaction with the work for the company	Maslow (1943); Vroom (1964); Adizes (2014); McGregor (1960); Vroom & Deci (1977); Cardoso et al. (2015); Eaton (2008)

Based on the results it is possible to understand the actual status of the company in terms of corporate agility. While **evaluating the results it is important to remember that pure agility aims to avoid any limitation and to acquire ability to embrace any change**. However, corporate agility is the balance between the minimally necessary bureaucracy and organizational flexibility. Thus, evaluation of the results should focus not only on the bureaucracy and ways to reduce it, but concerns should also be raised if the scale shows a super agile organization, which might point to mess and chaos within the organization, and respective adjustments should be made accordingly. The full picture cannot be completed without understanding the interpretation of the employees. General guidelines for implementation of corporate agility as regards to each factor and department are described in step "Truth: Data analysis, interpretation and conclusions" description.

"L" (Learning) – Learn the results. Each response is assigned a number value that is a score. By filling the whole table, the total score can be calculated. The higher the total score the less agile organization is. After summarizing the results, the level of agility can be determined for the whole entity as well as for part or department. However, the analysis should focus not only on specific department, but also on the level of employee since the perception of the corporate agility varies depending on the position. Mark those who identified him/herself. It is important to allocate the interviewed at least by groups. Making such allocation the analyst may check how different groups see and evaluate the corporate agility and the company itself. Departments, education, gender, years of experience (work experience), all this will help to make a cross section analysis from different angles. During the analysis it is important to pay attention how many answers were not provided and why. The remarks also play an important role, providing the missing points.

"I" (Interview for Gathering Data and Confirming Initial Observations) – In social sciences it is well known that interviews are one of powerful tools for data collection and

validation. Usually, the process involves two or more people exchanging information through a series of questions and answers, which could be performed via direct communication person to person or on remote mode (interview on telephone, video conference, etc.). In the interview, the questions are designed by a researcher to get information from interview participants with a particular aim based on a certain subject matter or set of themes.

For the evaluation of the company corporate agility the interview is an important tool for gathering very detailed information on specific topics identified during the questionnaire, to follow-up questions based on responses collected, or for studying a complex or potentially confusing topics identified by the employees of the company. Basically, this is also a good tool for the Agent and overall change management team of the company to make final decisions.

The interview method is described by many scientists and researchers (Trochim, 2005; Legard et al, 2003; Berg, 2009 and others). For the interviewer besides the experience in the interview, the most important part is to create right set of questions. Usually for interviews open ended questions are used (Ryan et al., 2009). According to Ulrich & Eppinger (Ulrich & Eppinger, 2003) four One-on-One interviews provide more than 80% of needs identified. However, author recommends holding interviews with at least one representative of each department, while for the project management/construction department two to three representatives would be highly useful. The employees' interviews should be supplemented by one with the top management to analyse the gaps among the organizational strata. Depending on the scale and structure of the company the interviewer should determinate the number and background of people to be interviewed. It is recommended to start with those who identified themselves. The talk with them will be more open and free. However, it is important to talk with those who did not identify him/herself and to understand why they did so. The interviews may be handled in a structured, semi-structured or unstructured way (Ryan et al., 2009). In any case the interviewer, based on the written results, should chose tactics for conducting these personal interviews, it may be a general discussion where important points are not asked directly, or the interviewer may choose to go through the questionnaire and discuss it in detail. The latter will certainly provide more precise data. The employee suggestion and ideas for improvement should be discussed.

According to Brounéus (Brounéus, 2011) a one-hour interview is not something unusual. However, author suggests having hour- hour and a half for in-depth interviews, especially with top managers.

Legard et al. (Legard et al., 2003) suggest scheduling an interview and use ground mapping questions, to warm up. Afterwards continue with dimensions mapping and perspective widening questions, and then continue with content mining questions. Since the interview is being held after the questionnaire was filled, the number of questions and their structure depend on the questionnaire's results. The interviewer should use questions requiring answers as broad as possible, for instance:

- What makes you say that?
- Could you please explain what you mean by it being a classic case of....?
- Earlier you were saying that you were delighted with how the project went, but you've also said quite a lot what did not go so well. What are the main reasons for that?
- Can you please explore your answer from the questionnaire?
- How did you/other colleagues reacted when you/they were informed of....?
- How does that particular process work?
- What would you improve/do differently?
- What do you like/dislike in your superior/ company policy.....?
- What is the main stimulus for you motivation?

Interviewer should listen, be interested in the personality of the respondent, allow him/her time to reply, assure that there is no right or wrong answer and so on.

Ryan et al (Ryan et al., 2009) suggest having the verbatim account of the interview (video, audio records that are transcribed and verified by interviewee). The interviewer can also make notes, coding, and remarks to systemize data received. After the interviews are completed and data is received the analysis and interpretation of the results should be performed and presented to the management during the stage Truth.

“T” (Truth: Data analysis, interpretation and conclusions). This is the phase when results are being analysed, interpreted, presented and the true situation is unveiled. According to Reichertz (Reichertz, 2014) there are three data analysis approaches (abduction – search for theories, deduction – search for predictions, and induction searches for facts).

Ideally, the three stages happen in a subsequent order. In the actual research processes, they are sometimes mixed. Miles & Huberman (Miles & Huberman, 1994) suggest three major activities involved in data analysis:

- Data reduction – data are transcribed, simplified and focus, usually occurs throughout the data collection phase;
- Data display – data are visibly presented on a graph or chart;
- Verification – possible conclusions and explanations are made from the data.

Ryan et al (Ryan et al., 2009) mention that software such as NUD*IST and NVivo can aid process of qualitative analysis, particularly for the large amounts of data. In any case, whether the data were analysed using software or not, the result should include the cross-analysis of the whole company and each department separately. The view of different groups should be provided. The detected weaknesses and recommended guidelines should be presented as well. The results part of the questionnaire should deal with the exposure of the weaknesses and guidelines for improvement. If the client/company decides to deploy these improvements, so the guidelines should turn into clear tasks, goals and paths to promote these changes. The determined weaknesses may show a need for an overall assessment of corporate life and operation, or it may point to problems in particular department(s) or field(s). Based on these results respective action plans should be elaborated. Author has elaborated and verified the questionnaire with construction industry's experts (see Appendix 17).

The descriptive summaries of each block of the questionnaire should be made, outlining important points for potential corrective activities if problems or weaknesses are detected.

The descriptions developed by the author of this research and verified by the experts are presented below.

Human resources – is the principal factor, since organization is a group of people. Personal and team trainings, personal growth and development programs should improve the broad-minded thinking and motivation of the employees. It might be useful to combine such courses with team-building events. Maintaining a creative and motivating atmosphere and carrying individual approach of “getting know your employees” can make a significant difference. Deep understanding of personal needs and goals, explanation of corporate ones,

the routes to express their satisfaction or dissatisfaction with the company, or a particular person, the dialog between the company and employees will undoubtedly improve the situation. Organizing employee engagement activities suggested by the employees during the interviews is a good place to start. Nevertheless, HR will always conflict with production and business, thus it is also important to keep it balanced. The construction company should promote personal growth, but primarily it should qualitatively build projects and earn money. Therefore, the abovementioned should, essentially, serve the interests of the company.

Communication – generally is not considered a top priority by most companies in the construction industry, companies founded and managed primarily by engineers, who rarely look around, but rather concentrate on one goal – to build. However, as was proven, communication, including reputation of the company has a significant (10% share) of impact on corporate agility.

External communication includes interviews, participation in events, presentation, presence on the core market, brand awareness, reputation. The abovementioned can be improved by hiring a marketing consultant that may elaborate the corporate style, choose the company's face, and promote company on the given market. While the later, the reputation, company mainly is build on its actions. A reputable company should avoid scandals, keep its promises, to clients and other stakeholders, should be a trusted partner – these activities require a long-term strategy, since not all most profitable actions are the right one to do. Long-term runners understand that reputation takes years to build and may be lost in just a day. Especially today, in the age of internet, digitalization and immediate news, nothing can be hidden. Thus, such communication and respective behaviour must be trained, especially by self-example of the top management.

Internal communication – the above is also true also for in-house communication. Employees should respect each other, be polite even if something does not go as they wish, keep promises, but what is more important, they should share information. It is very common for employees to hold back information, guard it as a kind of treasure, while limiting the access to information, in most of the cases, harms the project. Indeed, there is always a certain confidential and sensitive information that has to be protected, but most of it can and has to be shared to improve the performance. Another important component of communication is clarification. If something goes wrong due to employee's actions, he/she should know about

it, and be provided with an opportunity to recover. The reprimand should be done in private; any humiliation must be excluded. Often, management of construction companies sees its employees as soldiers of sorts, and give them unquestionable orders, rather than trying to involve personnel in the problem solving. Such communication leads to demotivation and degradation of the employees. Furthermore, here the example set by top management is crucial.

Operational planning and approach – poor planning is one of the major reasons for the loss of profit in the construction project. Poor planning and approach are directly related to human capital and communication issues. If a person in the planning position likes his/her job and is broad-minded and creative, cares about the overall success of the company, treating it as personal success as well, understands that no construction company's team or department can be a one-man-show, then he/she will do everything to complete the job in the best way, mainly concentrating on planning the works ahead in order to keep up with set the schedule and avoid losses. Another issue might arise if, despite the good will, the employee is not capable to plan, then, due to the personal disorganization, he/she just should change the job or position. In both cases, lack of personal ability to plan or due to the wrong attitude to work, serious adjustments should be made. Internal soft talks and enforcement of necessary processes to force person to plan, involvement of external coach, if needed, should result in improvement. Although this section of the questionnaire is relatively short, it provides important information about the department/team the person is working in. Based on these valuations, the Agent may obtain additional information about the atmosphere within the team. Agent, using additional information from other parts of the questionnaire, should detect whether the problem is due to one manager, or there is a comprehensive problem in whole department. Special attention should be set on the departments that may cause the biggest losses due to the poor planning – construction sites, tenders, technical department, top management. The planning is a key word in agility – the company should forecast and be prepared for any change.

Management and Organizational Behaviour – Poor management is directly related to communication and human capital topics and is integrally linked to planning. This part of questionnaire deals with the ability to accept changes, cooperation between departments and decision-making process. At the same time, management is also responsible for creation of

the healthy working atmosphere, mutual trust, and communication. Organizational management and behaviour are about how people behave in routine and/or situations. The manager must take care of all problems that prevent professionals to perform their jobs to best ability. His/her intervention should be limited as much as possible, and should stay at level of guidance and recommendations, accompanied by continuous light (gentle) supervision. The manager who leads by self-example shows the accountability he/she undertakes, the responsibilities he/she delegates, the attitude and protection of subordinates he/she maintains, which creates a working atmosphere and trust or lack of both. If subordinates do not feel trusted, and do not trust their superior, no agility will exist or assist. They will perform the required minimum, no broad thinking or creativity or passion will appear, and in the end they will leave. Improvement of these skills should be done by internal guidance from the top management and the involvement of external coaches for both individual and group trainings.

Structure and Corporate governance – as discussed above, correct organizational structure and corporate governance are key factors to corporate agility. Here the employees should respond whether they think there is a clear and transparent structure, and whether the level of existing bureaucracy is sufficient or not. If employees detect informal procedures that duplicate and bypass formal ones, if top management cannot make any decision without getting approval from the shareholders, or decisions change with intervention of shareholders, or, the opposite, the whole structure is so hierarchical that not only creating corporate agility, but even ordinary meeting should be scheduled months ahead, then a change is required. If there is no proper structure with flat but clear hierarchy with minimal level of bureaucracy no company will survive in a long run. The structure cannot be based on one or two persons that make all decisions, while others only implement them. The structure should be as flat as possible to avoid unnecessary delays in decision making process. At the same time, it should have a clear hierarchy that should be followed. Here the structure and corporate governance become an integral part of organizational behaviour and vice versa. The correct structure should be filled by right professionals with right work attitude, as even the best professionals shall not deliver any results if are wrongly organized. If the need for structural change is detected, it should be verified via other parts of the questionnaire and the interviews, since structural change is most anguishing. Generally, people resist change.

Each Change Agent should choose a tactics how to implement it, depending on many factors shaping particular situation at the given moment. Nevertheless, structural change is highly important and welcome, if required, but it still is followed by physical relocation of the employees' mergers or divisions within the company, creating new departments or elimination of existing, promoting and demoting of staff. During structural change there is one fixed rule – **never build a company around particular people**, always make a right structure, and only then humanize positions. Some people will leave, some will stay, new employees will join, but all this should occur within the previously set cells of the corporate beehive. As in other positions, here the readiness to change, projected from the top, will assist a great deal, the involvement of external consultant will be highly recommended, since he/she would have a fresh perspective on the whole system.

Strategy and Values – This part deals with strategy and values, or lack of them. Although it may seem that strategy is a topic set on the “clouds”, while values exists “here and now”, these two notions are closely interlinked. Values are an integral part of the company, they shape culture and provide guidelines for both corporate and personal behaviour, they serve as a basis for the short and long-term decisions. Company cannot set strategy if it does not define its values. To have the only value of maximizing profit at any opportunity is also a value, but no one should expect corporate culture and organizational behaviour like one used to be called the “wild west”. Setting the company strategy is guided by its values. The goals may not touch upon the values directly and remain the business orientated (profit, expansion, reorganization, new products, etc.) However, the road barrier on the path to these goals will be made out of values. The values and respective behaviour of individuals are dramatically affected by the environment, very few people can maintain divergent life norms and continue to live or work in a group (society) where none of its members accept them and have contrasting habits and values. Most people will accept the norms dictated by surrounding society. This is why organizational culture can change people, especially young specialists that have very little past experience or do not have it at all.

If the employees state that the company has no values, it should be reassessed. Most likely top management has their own values, but these were not commonly accepted, and certainly were not communicated. The same is applicable to strategy, if even top management has no strategy, then the value of such management should be reconsidered, but if main

strategic goals were not communicated to the rest of the team, then the cure may not be as painful as in the previous case. Setting values and strategy and their communication is a very important component of the corporate long-term success. People who wish to know their career path for the next 30 years do not work in private construction companies, they work in huge financial and state institutions. The construction industry staff is ready for challenges, different locations, joint ventures and expansions. And, even project based contract workers would like to know that company has at least an approximate vision where it navigates for the next few years. Others want to feel certain confidence in their future and to know that their work contributes towards something more than just profit to the shareholders. So, if significant problems with these issues arise, it is highly recommended to consider structural reorganization including replacement of the top management, or external consultant involvement.

Financial – Financial factor is next to last among the affecting factors. The financial characteristics are not the origin of the problem, but its result. Due to such lagging effect, the responses should be carefully analysed by Agent. Many employees may not be aware of most of the financial data. Agent should ask people not to search for answers in annual reports or consult bookkeeping, the answers should be provided according to their current knowledge, since it is not the level the level of knowledge that is examined here, but organizational structure, behaviour, information sharing and communication. The data of real financial results should be taken from financial officer directly and analysed, concluding the level of corporate agility accordingly. It is important to analyse the responses to these questions that came from the top managers, then the level of involvement, broad thinking, true information sharing, and trust level can be detected. If the latter is not sufficient, the significant structural and personnel reorganization and refresh at the top level is advised.

Influence of PESTEL factors –The element with the least weight of impact on corporate agility. Influence of PESTEL factors is considered more as an external macro factor that limits and affects the whole organization, which has to be agile enough to respond to these limitations, while continuing to successfully operate. Analysing the results of this section the question of their dynamic change should be evaluated. Since frequent changes indicate an unstable external environment, so risks and structural changes should be considered.

General Evaluation – general evaluation does not require any particular actions, but it provides a kind of an overall summary of corporate perception of employees. The results received in this part may serve as a benchmark for Agent’s conclusions. And recommendations.

“Y” – Year(s) – the development and implementation of the recovery activities for the problems mentioned above is a highly time-consuming process. Immediate results should not be expected. Hard daily work should show some change indicators after many months. It is recommended to repeat the questionnaire a within six to twelve months from the start of **implementing the change**. Follow up meetings and monitoring talks do not have to be excluded, but the latter will provide a feeling or an indication, while the overall questionnaire would give a comprehensive picture. Employees should “forget” the questionnaire in order to fill it out honestly having no memories of how they responded previously. Then the results will show change, if any, in real time. Sometimes it is worth to rephrase the questions to get more reliable data. Needless to say, change implementation, control and monitoring should be led preferably by the same Agent that led the identification process and determined the level of the corporate agility of the construction company.

As was previously mentioned, author based the his change implementation approach on Burnes (Burnes, 2017) studies and author’s personal experience as a founder and board member of a large international construction company. The first two elements of implementing change, that should be considered, are speed and focus of change. Please see fig 4.3 for the correlation between the speed of change and elements within the organization that are being affected.

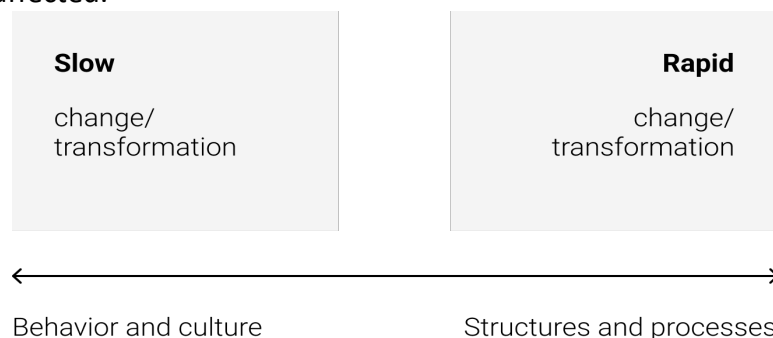


Figure 4.3 Speed and the focus of change adapted from Burnes, 2017.

The necessary changes for corporate agility improvement may require change in behaviour and corporate culture that leads to the long-term process of “reformation” of the employees and change of their way of thinking. It may also require the structural change that may occur relatively rapidly but will be followed up by slower process of “getting used to” or, in other words, by institutionalization. The latter will require some cultural and behavioural changes, but these will occur in a natural way. While setting the framework for change the following chart in fig. 4.4 can be used.

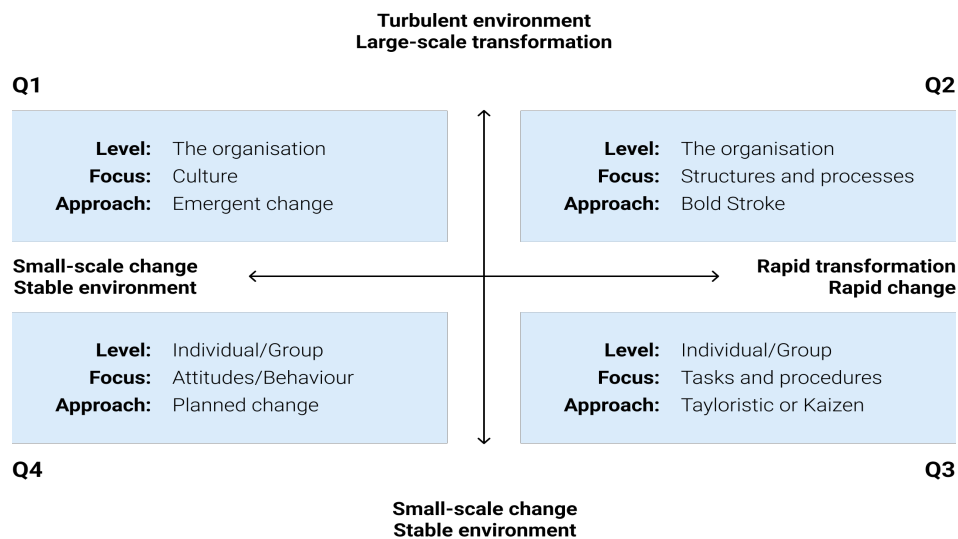


Figure 4.4 A framework for change adapted from Burnes, 2017.

The required/recommended changes should be evaluated from its implementation point of view. The chart above represents different scales of changes and their impact on the organization. It is important to take these factors into consideration while implementation plan is being developed. Is company stable enough to undergo holistic transformation in culture and structure, or should it start with small-scale change, approaching individuals and teams, changing their behaviour and particular procedures?

As was previously discussed, corporate agility should become an integral part of company’s DNA: structure, behaviour, decision making process, goals setting, communication and even way thinking. Thus, organization should be prepared for the change at any level and at any scale. The corporate agility’s improvement process cannot be finished. New challenges will require new transformations, which in their turn will require new tools and approaches. The management task is to keep company prepared to face and overcome any challenge to come while the minimal resources are being used, and while operational activity is being minimally affected. The role and personality of Agent, after the core transformation occurred,

and company could be considered as a corporately agile, should be reviewed. There is an advantage to have a specialist on board that knows the organization and accepted by its staff. On the other hand, the biggest disadvantage of such Agent is a too deep involvement in the company and its corporate life, by so losing the ability of having a bird's eye view and providing independent objective opinion.

4.2. Application of the Methodological Approach for Determination and Improvement of Corporate Agility in A Construction Company, and its further development

Application order:

Since implementation of Methodological Approach in full is long and time-consuming process the author has decided to validate the questionnaire and conduct interviews with few representatives of a large international company. This approach allows to check whether the questionnaire works or not, to improve it if needed, and prepare the initial recommendations to the company for improvement of its corporate agility after the process is completed. After the recommendations are submitted the decision on implementation of change stays with the company. In order to validate the questionnaire, in January 2022 it was sent to three representatives of JSC LNK Industries. After the questionnaire was completed, individual interviews were conducted with all three participants. The main data of LNK Industries is provided in Table 4.2.

Table 4.2

Year	Turnover MIO Eur	Profit	Nr. of employees	of Nr. of countries operates in/exports to
2017	106	1,1	766	14
2018	114	7,2	778	16
2019	121	8,48	781	20
2020	89	9	552	4
2021**	75	3	560	4

* consolidated data including affiliated companies, source: company data.

** not audited data

The short summary of the results is provided in table 4.43 (see Appendix 18 for the results of the questionnaire and details of the respondents.)

Table 4.3.

Level of corporate agility at JSC LNK Industries

#	Block of the questionnaire	Results		
		Resp. A	Resp. B	Resp. C
1	Human resources	4,90	6,00	5,90
2	Communication, including reputation	4,57	5,71	6,14
3	Operational planning and approach	5,80	6,40	6,00
4	Management and Organizational behaviour	5,75	6,38	6,50
5	Structure and Corporate governance	4,56	5,11	5,33
6	Strategy and Values	6,86	7,71	7,14
7	Financial data	6,64	6,55	7,17
8	Influence of PESTEL factors (political, economic, social, technological, environmental, legal – external macro factors)	3,50	4,33	4,83
9	General valuation	4,80	5,60	5,20
	average	5,26	5,98	6,02
	Overall average	5,75		

The results show medium level of corporate agility. Considering the size, the global operation and other industry's problematic/limiting factors this result can be considered as a good one. However, going through the results in detail (68 questions and answers) one may find fields in which the company should improve its performance.

Author will not analyse answers in details, nevertheless some general conclusions can be made based on the results received from the respondents. The overall results analysis shows that the lower the position the lower the detected level of corporate agility, Respondent A, who is a board member of the company, considers company to be 12% more agile compared to the valuation given by the Respondent C, who occupies a position of a project manager. Another issue to think about is that engineers (Respondents B and C) perceive the company as being less agile. These findings should be confirmed by larger number of respondents.

Human Resource issue, the factor with the second weight, is always a problematic one. While board sees a big picture, project managers deal with personal issues of both "white collars" from the project management team and "blue collars" from the construction site. This conflict of interest and perception escalate when the project is initially won with insufficient budget, or when the project is highly profitable, but all profit is redirected to cover losses from other projects. In such cases the issue of human resources may be wrongly valued. The

Agent should go deeper in order to understand whether there is an ongoing wrong practice or it is a specific and temporary issue.

Another topic to be studied in detail is an internal communication. The mid-level management considers it insufficient, and, as a result there is a poor understanding of strategy and goals, as well as of financial data of the company. One may find that board member thinks that it is appropriate and acceptable..

The provided results indicate that in general the company is in a good shape with corporate agility value measuring above '5', it still should aim to lower it, but the difference is not significant. Improving communication may appear to be the only issue that needs to be fixed. After the necessary measures, but not earlier than 3 months, author suggests resending questionnaire once again to verify whether the taken actions were successful.

Possibilities for further development of Methodological Approach for Determination and Improvement of Corporate Agility in a Construction Company in the Context of Managerial Decision-making Process

Even though, the questionnaire was validated, its viability was proven, i.e. it allows a comprehensive analysis of the company and determines the level of company's corporate agility, still there are several issues that might be improved upon.

- a. **The length of the questionnaire.** 68 questions may seem too much. On the one hand, it allows to make a comprehensive analysis of the company, to verify the results by comparing answers to different, linked questions. It allows also to conduct a deep structured interviews at a later stage, to go through the questionnaire and discuss with the respondents their answers and comments in details. On the other hand, such extensive list of questions disrupts the initial gathering of information. If filling the questionnaire takes too much time, respondents either will not fill/complete it, or will not think thoroughly on the provided answers. Both cases do not work for the process initiator. One should think how to solve the problem. Author would suggest considering the development of a two-step questionnaire process. Shorter questionnaire may be distributed at the first phase, then the sample group/groups would complete the detailed questionnaire at a later date, and in-depth interviews would finalize the process.
- b. Important aspect to further improve is **the way the questionnaire is filled out and analysed.** Now it is done in excel format, filling the numbers manually. It is worth

considering the development of the automatic software tool, which would allow to automatize the process, make the process of filling clearer and visually obvious. **The software tool should also provide a solution for the graphical presentation of valuation and option to compare historical results.**

- c. Additional point for deeper investigation and further research is **the tools and approaches used during the post analysis process.** The phase “Years” presented in A.G.I.L.I.T.Y. concept within Methodological Approach is truly lengthy. Here the professional and managerial knowledge of the board and Agent should be combined with high emotional intelligence and uninterrupted monitoring and control to understand whether the suggested solutions are really accepted by the staff and being implemented. The tools and approaches can vary.. Valuation and perception are subjective, and any result received should be confirmed during the implementation of Methodological Approach, especially during the “Learning”, “Interview”, “Truth” and “Years” phases. Another step further would be to determine the most common problems the construction companies face while improving their corporate agility and to develop a manual for their elimination.
- d. Final point to consider is the **adaptation of the questionnaire for the companies operating in other industries.** The scope of the questions might be similar. The in-depth analysis of the factors affecting the operation of the organization, cultural issues, organizational behaviour, corporate agility, and other topics that have a significant influence on the specific industry should be studied to make necessary adjustments. These are important for both the precision of questions and tools being used during the process of evaluations and conclusions. Any project-based company that has common characteristics with the construction company, it can be evaluated in a similar manner.

Conclusions and recommendations

Within a framework of the dissertation several conclusions were made.

Construction companies and industry has been developing through ages together with mankind and the terminology had been as diverse as the industry itself. Within the dissertation the author has analysed several terms which characterize the industry. For the better understanding of industry particularities in course of the research the author had proposed upgraded definitions.

Within a course of dissertation, the term *Corporate Agility* was analysed by reviewing theoretical frameworks for corporate agility, and on the basis of the research the author has found main components of corporate agility, adapted them to the construction industry and offered his own definition of *Corporate Agility* which is applicable for a construction company and industry.

For determination of the most significant problems in the construction industry, factors affecting operational activities of the construction company were identified.

Based on historical and statistical overview of the industry, literature overview, qualitative content analysis (generated from 667 codes), interviews with industry professionals, 13 significant factors (that affect operational activities of the construction companies) were determined, namely: strategic long-term planning, short-term planning, quality of processes' management, structure and organizational behaviour, targets, financial resources, human resources, risk management, globalization, PESTEL, availability of resources, PR and communication, stakeholders' management. Research results confirmed that, if not controlled, these factors do not allow construction companies to properly and timely react and face the challenges of modern business environment.

The analysis of a construction company within concept of corporate agility was performed. For this purpose, review of corporate agility of support and primary activities of the construction company was done. It was discussed and proved that corporate agility of support and primary activities, with particular focus on cross-departmental cooperation and personal and corporate goals alignment, improves corporate performance of the construction company. For the implementation of the corporate agility 'A Captain' model for work with stakeholders was developed.

Within the scope of research corporate agility in strategy, corporate governance, organizational behaviour, and general management of the construction company were studied and discussed. Agility of the management processes through different corporate levels is being translated into agility of the whole system, while lower levels have more restrictions than the top.

A lot of emphasis in the research is putted towards analysis of primary and secondary activities of the construction company with a focus on operations, services, marketing and sales, as well as cultural differences etc.

Within the research 8 major factors affecting corporate agility of the construction company were determined. The research confirmed that 48% of influence on corporate agility of the construction company is attributable to two factors only – human resources and structure, further 36% were contributed by management, planning. As a result the list of tasks to enhance the corporate agility was developed.

The research results confirmed that there is a strong demand for corporate agility in the construction industry. This was confirmed by field research, which included 508 participants, whose response data was analysed using Alteryx, an Analytic Process Automation platform. For the implementation of corporate agility in a construction companies the author has developed methodological approach for the determination and improvement of the level of corporate agility of the construction company (A.G.I.L.I.T.Y.) which was tested on the example of Latvian Construction company, LNK Industries, that operates in several countries. After testing the methodological approach, the author drew the recommendations for perfection of this methodology in the future.

Based on the field research, literature overviews, content analysis, theoretical frameworks, and interviews with industry experts **the hypothesis of the dissertation** that there is a demand for corporate agility in the construction industry, as well as two sub-hypotheses: H1: A well-balanced corporate agility may significantly improve performance of the construction company, and H2: Detecting the level of corporate agility is an essential step for the overall improvement, successful development, and operation of a construction company - **were proved.**

Author has elaborated set of recommendations which are addressed by groups of interests.

To the representatives of the construction industry, especially for owners and CEO's of the construction companies:

- To ensure competitiveness and productivity of companies, and it is strongly recommended to analyse the agility level of each company and to create more agile governance.
- A detailed (comprehensive) study of factors affecting operational activities of the construction company is highly recommended. Both internal and external activities to mitigate negative impact of these factors should be evaluated.
- In-depth study of general management, organizational behaviour, and corporate governance in terms of corporate agility is highly advised for mid and top-level managers.
- To promote the term of corporate agility within the construction industry. It is recommended to organize different events, forums, conferences etc. to promote agile concept.
- To apply methodological approach "A.G.I.L.I.T.Y." within companies to develop and ensure implementation of corporate agility.
- For those companies who are operation in several markets/countries, it is recommended to diversity corporate agility and adjust it to the needs/requirements of the country and national particularities.

For local authorities, municipalities, and government of countries:

- It is advised to review further the main problematic factors that burden the development of the industry – over – bureaucracy and over regulation of the construction industry, low productivity, lack of skilled manpower etc.
- It is recommended to conduct broader research in different geographic regions to study the demand for corporate agility construction industry and compare it with other countries, for example, Western and Eastern Europe, South and North Americas, North and South Africa, India, China, South Asia etc. because it could be different in the different countries.

To educational institutions:

- It is highly recommended to include this concept in educational programmes of higher educational institutions and programs provided by the construction institutions for the industry's professionals.

In conclusion it should be noted that theses brought forward for the defense:

There is a demand for corporate agility within the construction industry – Confirmed.

Vast number of complicated factors affects operational activities of the construction company – Confirmed.

Determination and importance of factors affecting corporate agility of the construction company – Confirmed.

There is possibility to develop methodological approach for determination and improvement of corporate agility level in the construction company – Confirmed.

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Appendixes

Appendix 1. Interviews with 4 construction industries experts (The extract from minutes)

Appendix 2. The detailed overview over Hofstede's 6 cultural dimensions

Appendix 3. Questionnaire of corporate agility of the construction industry

Appendix 4. Alteryx software analysis data.

Appendix 5. Questionnaire results

Appendix 6. Definitions of the "construction" and "construction industry"

Appendix 7. Statistics

Appendix 8. Content analysis chapter. The key factors affecting operational activities of the construction company.

Appendix 9. Interviews with construction industries experts (extracts)

Appendix 10. Interviews with construction industries experts (extracts)

Appendix 11. Structure construction company

Appendix 12. Interviews with 4 construction industries experts (extract).

Appendix 13. Legal pros and cons choosing the legal form of entering new market developed by author

Appendix 14. Activities of the building project's phases in the concept of corporate agility

Appendix 15. Factors affecting agility of the construction company

Appendix 16. Agility flow chart

Appendix 17. Experts focus group conference calls. The extract from minutes

Appendix 18. LNK agility questionnaire

Interviews¹ were conducted during the end of 2020 and beginning of 2021.

Experts: board member of the construction company, 20 years of experience, board member, of the construction company, 16 years of experience, board member, of the construction company, 7 years of experience, technical director of the construction company, 18 years of experience.

Author presented his findings and suggested terms' definitions for experts' approval: corporate agility, corporate governance, and organizational behaviour of a construction company. Author discussed with the experts the essence of each topic.

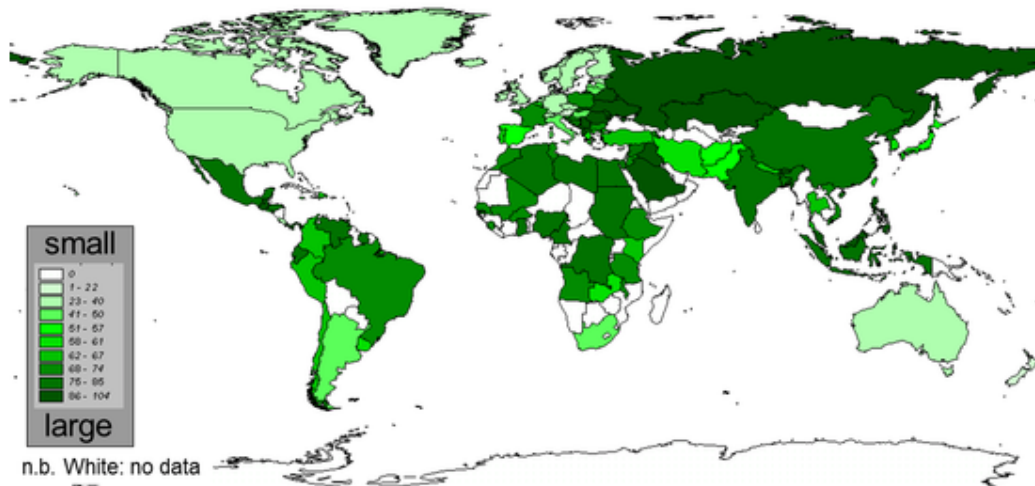
Nr	Topic for discussion	Definitions approved by all experts
1	Corporate agility	Corporate agility is a company's ability to identify and effectively react to internal and external opportunities and/or challenges and/or unpredicted changes within the shortest possible time frame, through the maximization of cross organizational synergy and the minimal resources' (financial, HR and etc,) usage for such transformative activities.
2	Corporate governance	Corporate governance is the way in which the top management of the company is being controlled, supervised and limited by major and/or minor shareholders and major influential stakeholders.
3	Organizational behaviour	Organizational behaviour is actions of individuals and teams within organization and their influence on the organizational effectiveness and performance.

prepared by Jevgenijs Locovs

¹ According to K.T.Ulrich and S.D.Eppinger, "Product design and development", 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

Dimension maps: Power Distance

Power Distance World map

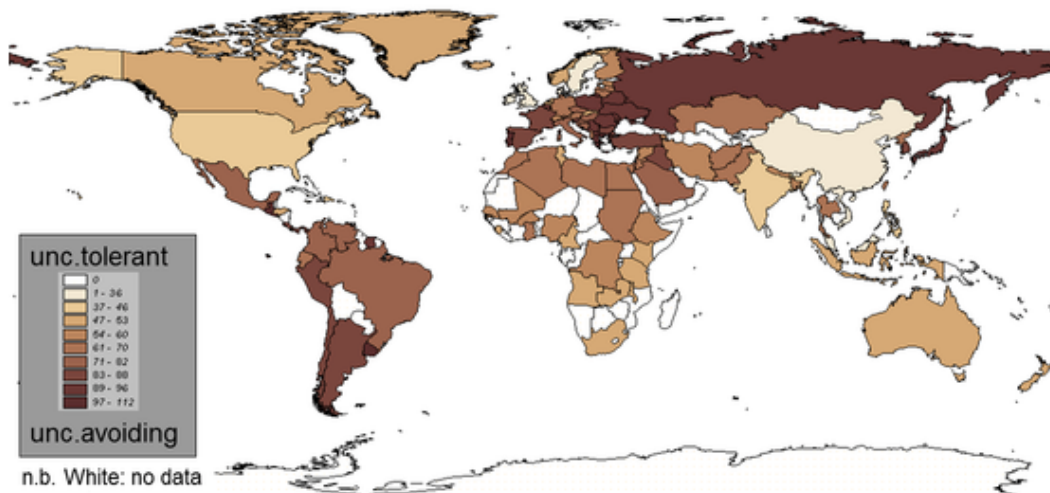


<https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/>

Ten Differences Between Small- and Large- Power Distance Societies		
	Small Power Distance	Large Power Distance
1	Use of power should be legitimate and is subject to criteria of good and evil	Power is a basic fact of society antedating good or evil: its legitimacy is irrelevant
2	Parents treat children as equals	Parents teach children obedience
3	Older people are neither respected nor feared	Older people are both respected and feared
4	Student-centered education	Teacher-centered education
5	Hierarchy means inequality of roles, established for convenience	Hierarchy means existential inequality
6	Subordinates expect to be consulted	Subordinates expect to be told what to do
7	Pluralist governments based on majority vote and changed peacefully	Autocratic governments based on co-optation and changed by revolution
8	Corruption rare; scandals end political careers	Corruption frequent; scandals are covered up
9	Income distribution in society rather even	Income distribution in society very uneven
10	Religions stressing equality of believers	Religions with a hierarchy of priests

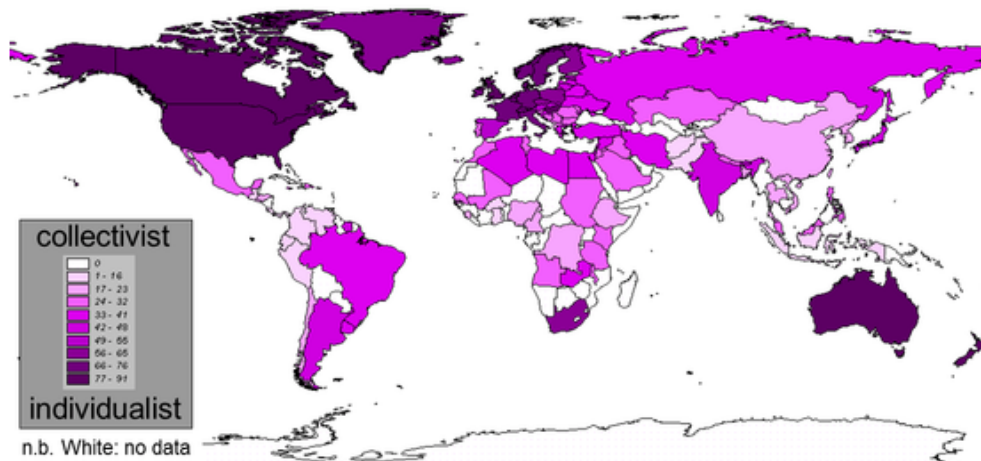
Dimension maps: Uncertainty Avoidance

Uncertainty Avoidance World map



Ten Differences Between weak and strong Uncertainty Avoidance		
	Weak Uncertainty Avoidance	Weak Uncertainty Avoidance
1	The uncertainty inherent in life is accepted and each day is taken as it comes	The uncertainty inherent in life is felt as a continuous threat that must be fought
2	Ease, lower stress, self-control, low anxiety	Higher stress, emotionality, anxiety, neuroticism
3	Higher scores on subjective health and well- being	Lower scores on subjective health and well-being
4	Tolerance of deviant persons and ideas: what is different is curious	Intolerance of deviant persons and ideas: what is different is dangerous
5	Comfortable with ambiguity and chaos	Need for clarity and structure
6	Teachers may say 'I don't know'	Teachers supposed to have all the answers
7	Changing jobs no problem	Staying in jobs even if disliked
8	Dislike of rules - written or unwritten	Emotional need for rules – even if not obeyed
9	In politics, citizens feel and are seen as competent towards authorities	In politics, citizens feel and are seen as incompetent towards authorities
10	In religion, philosophy and science: relativism and empiricism	In religion, philosophy and science: belief in ultimate truths and grand theories

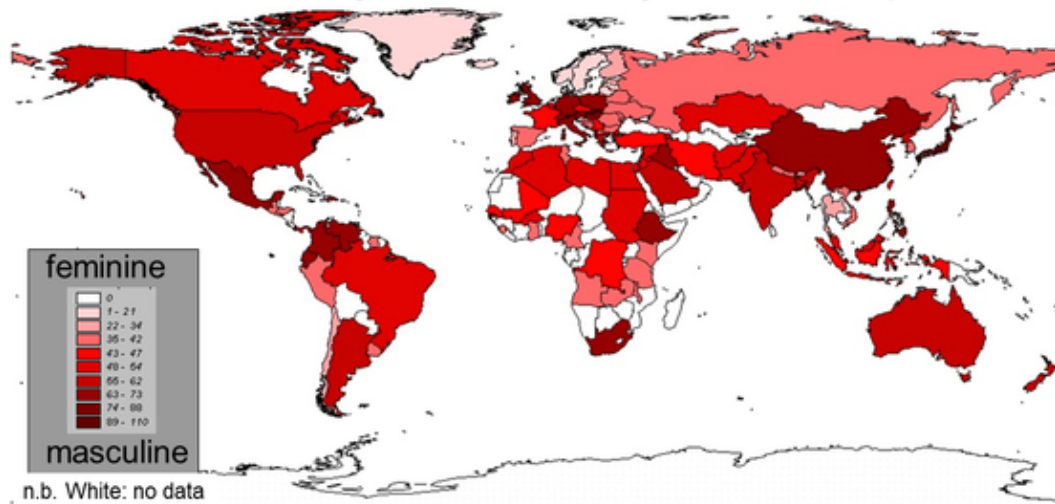
Collectivism – Individualism World map



Ten Differences Between Individualism and Collectivism		
	Individualism	Collectivism
1	Everyone is supposed to take care of him- or herself and his or her immediate family only	People are born into extended families or clans which protect them in exchange for loyalty
2	"I" – consciousness	"We" –consciousness
3	Right of privacy	Stress on belonging
4	Speaking one's mind is healthy	Harmony should always be maintained
5	Others classified as individuals	Others classified as in-group or out-group
6	Personal opinion expected: one person one vote	Opinions and votes predetermined by in-group
7	Transgression of norms leads to guilt feelings	Transgression of norms leads to shame feelings
8	Languages in which the word "I" is indispensable	Languages in which the word "I" is avoided
9	Purpose of education is learning how to learn	Purpose of education is learning how to do
10	Task prevails over relationship	Relationship prevails over task

Dimension maps: Masculinity

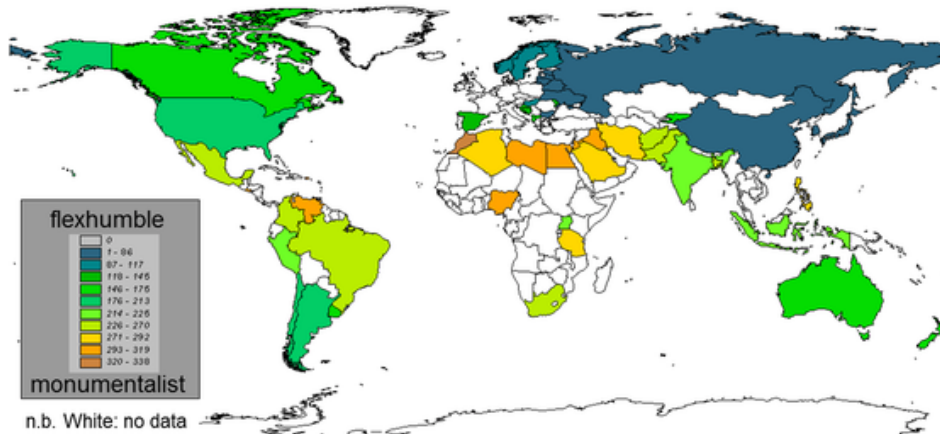
Femininity - Masculinity World map



Ten Differences Between Femininity and Masculinity		
	Femininity	Masculinity
1	Minimum emotional and social role differentiation between the genders	Maximum emotional and social role differentiation between the genders
2	Men and women should be modest and caring	Men should be and women may be assertive and ambitious
3	Balance between family and work	Work prevails over family
4	Sympathy for the weak	Admiration for the strong
5	Both fathers and mothers deal with facts and feelings	Fathers deal with facts, mothers with feelings
6	Both boys and girls may cry but neither should fight	Girls cry, boys don't; boys should fight back, girls shouldn't fight
7	Mothers decide on number of children	Fathers decide on family size
8	Many women in elected political positions	Few women in elected political positions
9	Religion focuses on fellow human beings	Religion focuses on God or gods
10	Matter-of-fact attitudes about sexuality; sex is a way of relating	Moralistic attitudes about sexuality; sex is a way of performing

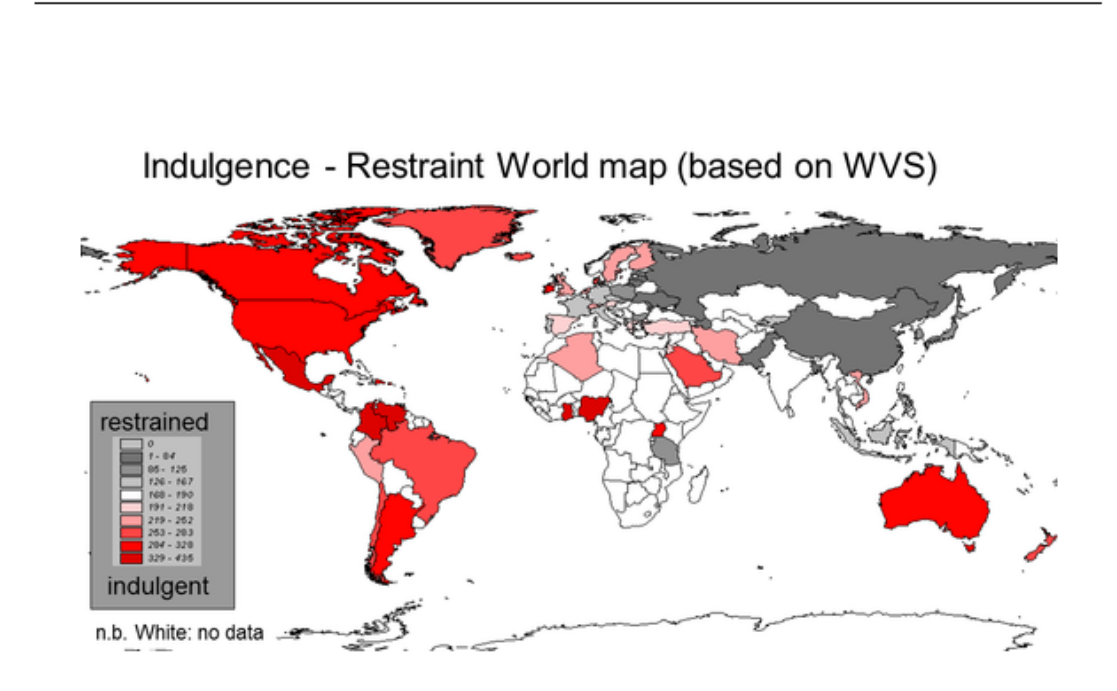
Dimension maps: Long-term Orientation

Short-term orientation (Monumentalism) – Long-term orientation (Flexhumility) World map (based on WVS)



Ten Differences Between Short and Long Term Orientation		
	Short-term orientation	Long-term orientation
1	Most important events in life occurred in the past or take place now	Most important events in life will occur in the future
2	Personal steadiness and stability: a good person is always the same	A good person adapts to the circumstances
3	There are universal guidelines about what is good and evil	What is good and evil depends upon the circumstances
4	Traditions are sacrosanct	Traditions are adaptable to changed circumstances
5	Family life guided by imperatives	Family life guided by shared tasks
6	Supposed to be proud of one's country	Trying to learn from other countries
7	Service to others is an important goal	Thrift and perseverance are important goals
8	Social spending and consumption	Large savings quote, funds available for investment
9	Students attribute success and failure to luck	Students attribute success to effort and failure to lack of effort
10	Slow or no economic growth of poor countries	Fast economic growth of countries up till a level of prosperity

Dimension maps: Indulgence



Ten Differences Between Indulgence and Collectivism		
	Indulgence	Restrained
1	Higher percentage of people declaring themselves very happy	Fewer very happy people
2	A perception of personal life control	A perception of helplessness: what happens to me is not my own doing
3	Freedom of speech seen as important	Freedom of speech is not a primary concern
4	Higher importance of leisure	Lower importance of leisure
5	More likely to remember positive emotions	Less likely to remember positive emotions
6	In countries with educated populations, higher birthrates	In countries with educated populations, lower birthrates
7	More people actively involved in sports	Fewer people actively involved in sports
8	In countries with enough food, higher percentages of obese people	In countries with enough food, fewer obese people
9	In wealthy countries, lenient sexual norms	In wealthy countries, stricter sexual norms
10	Maintaining order in the nation is not given a high priority	Higher number of police officers per 100,000 population

APPENDIX 3

Questionnaire of corporate agility of the construction industry Aptauja par korporatīvo elastīgumu būvniecības industrijā

Author presented his findings and discussed with the 4 construction industry's experts the structure of the questionnaire, the questions, and the valuation criteria. Interviews¹ were conducted during the end of 2020 and beginning of 2021.

Experts: board member of the construction company, 20 years of experience, board member, of the construction company, 16 years of experience, board member of the construction company, 7 years of experience, technical director of the construction company, 18 years of experience.

Experts approved the suggested questionnaire.

Respondents should fill their data to allow grouping and precise analysis of the results.

Vecums/Age:

Dzimums/ Gender:

Amats/Position:

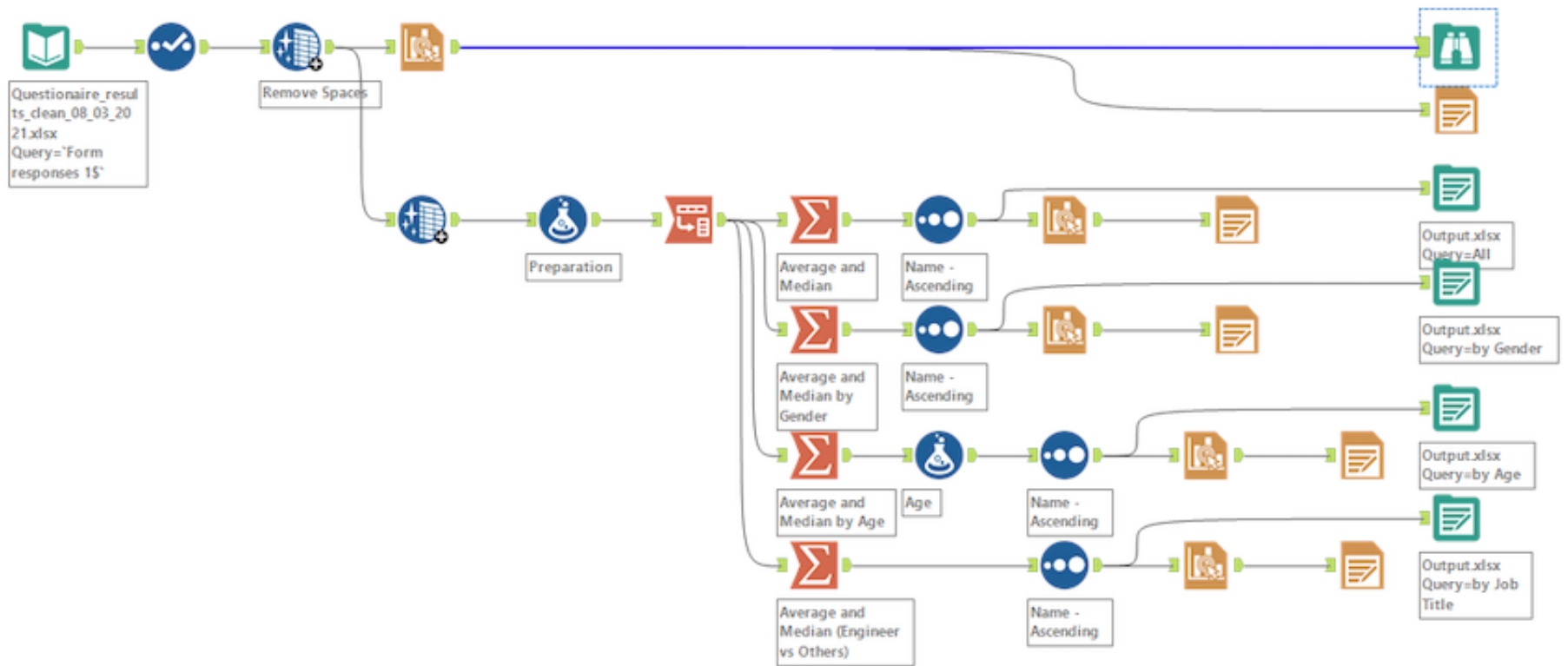
Departaments/Department:

Pieredze būvniecības industrijā/ Experience in construction industry: _____ years

Izglītībā/ Education: engineer/ not engineer – (place to write).

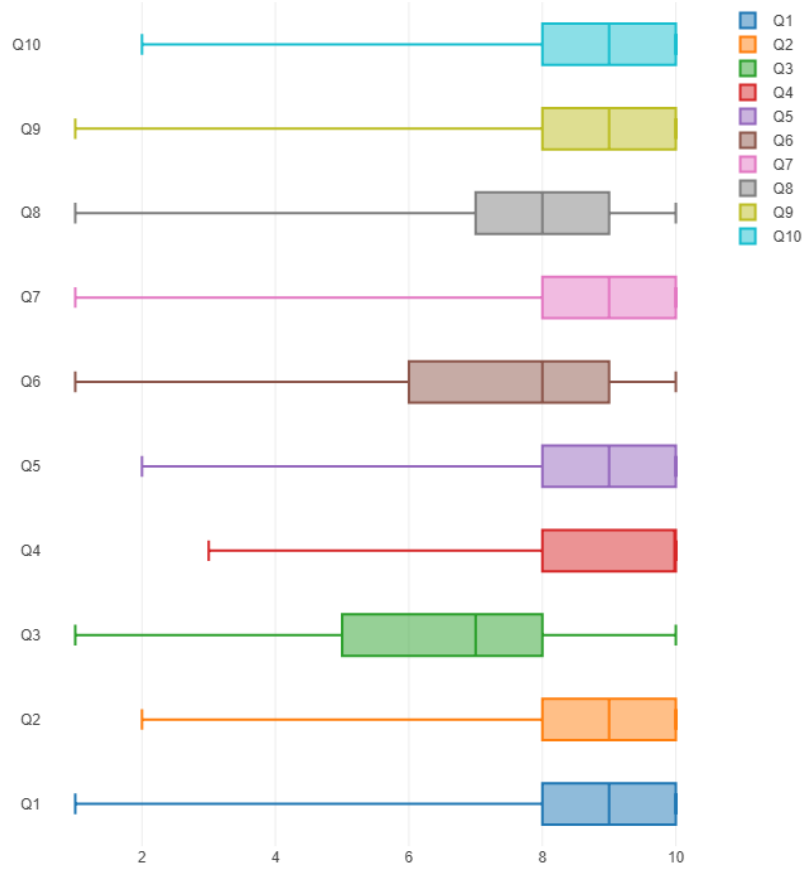
¹ According to K.T.Ulrich and S.D.Eppinger, "Product design and development", 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

Workflow

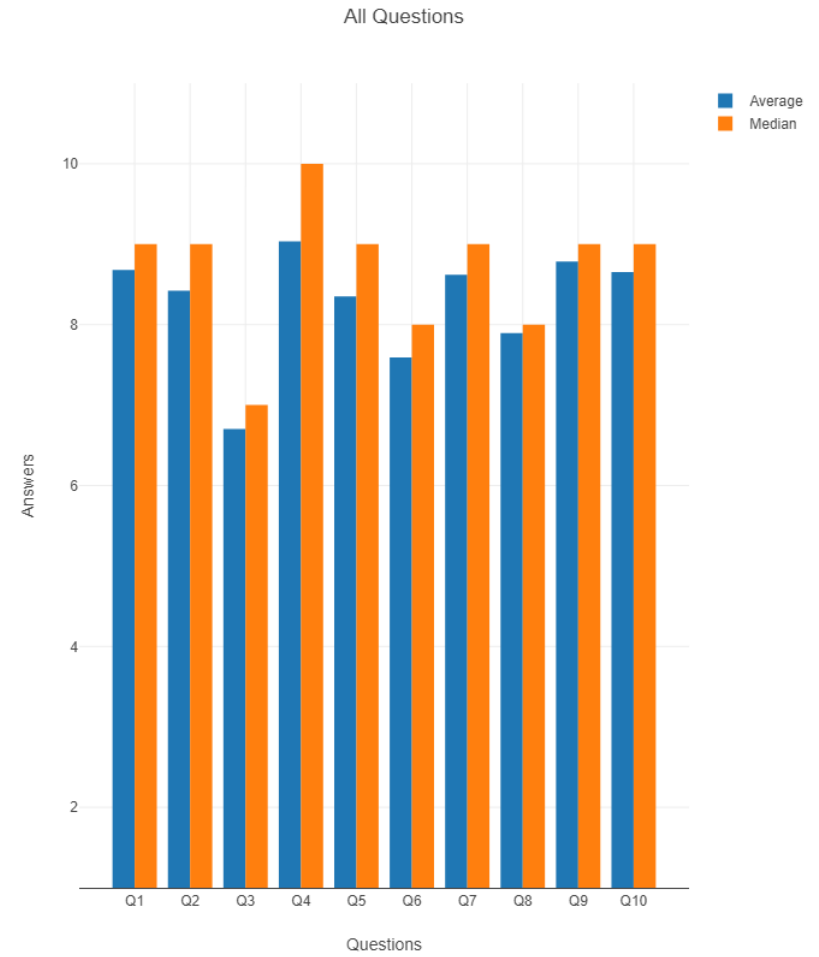


APPENDIX 4 CONTINUED
Alteryx software analysis data

Whisker plot

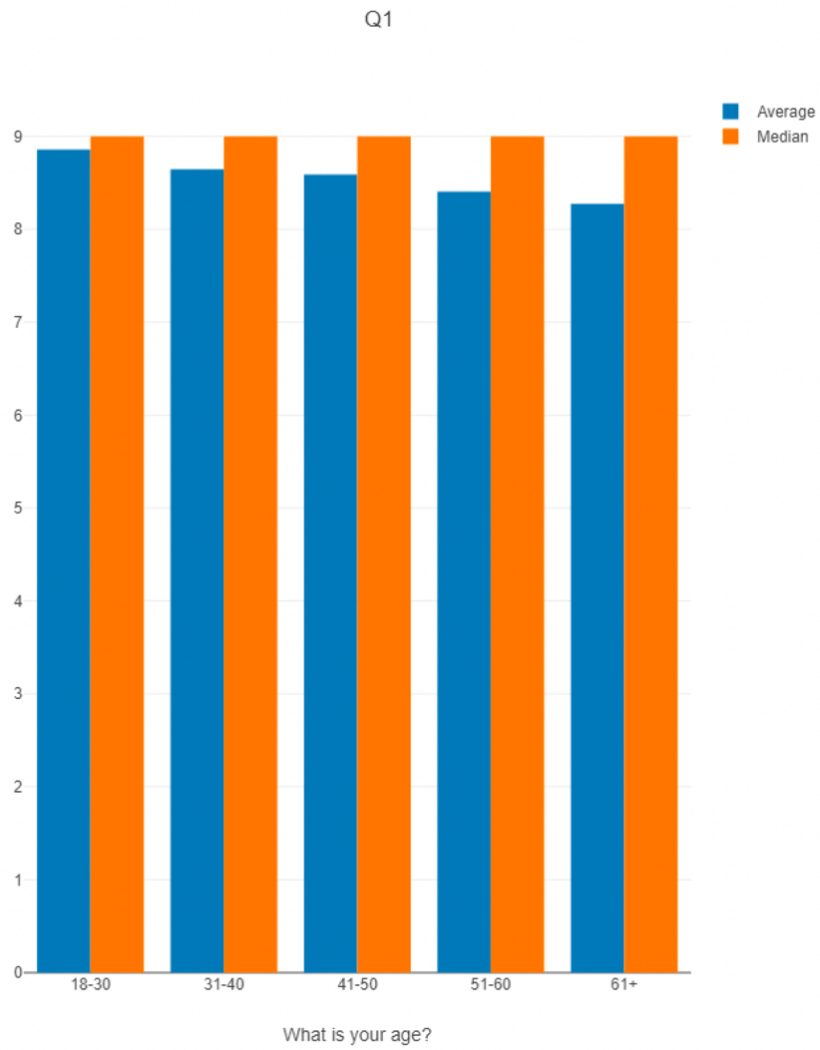


Average and Median data

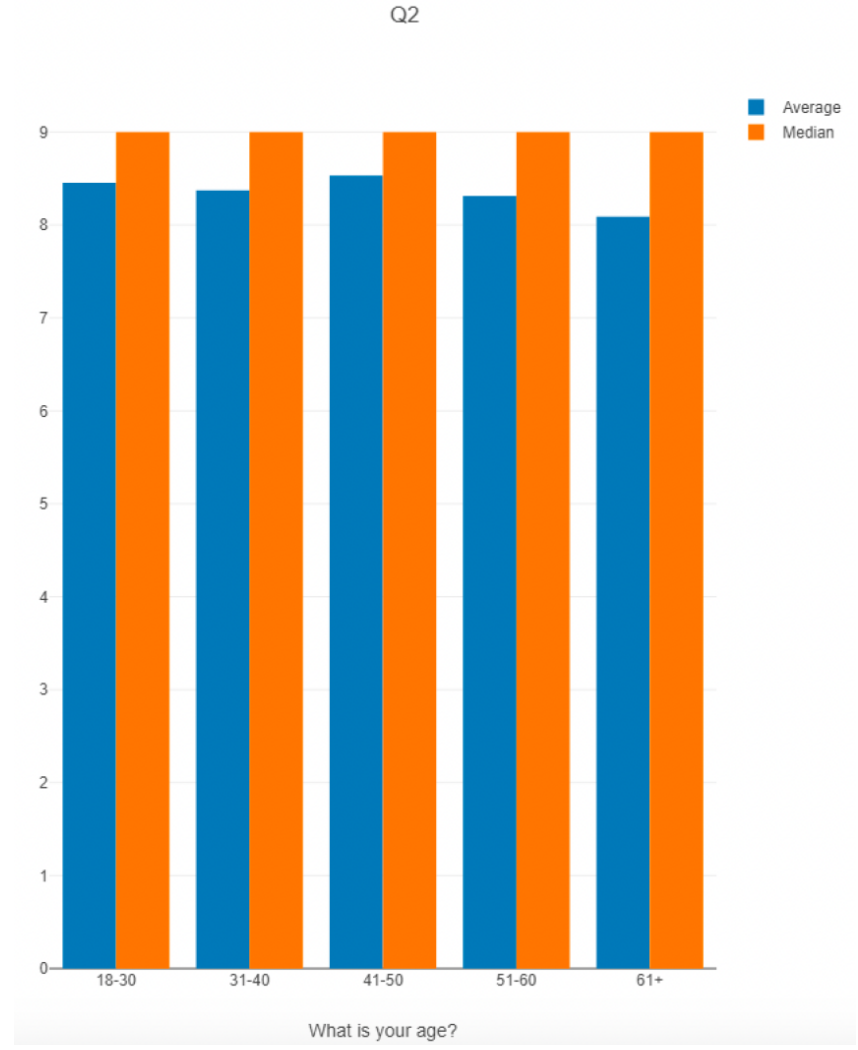


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 1 (Age)

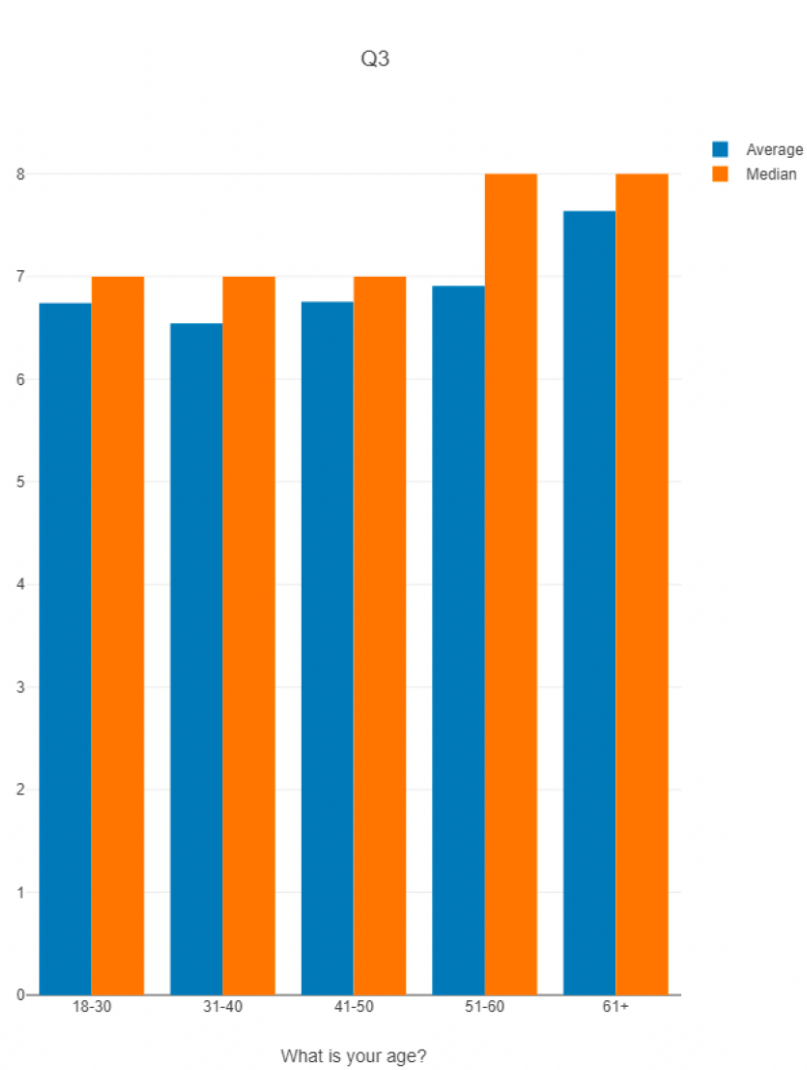


Average and median data of Question 2 (Age)

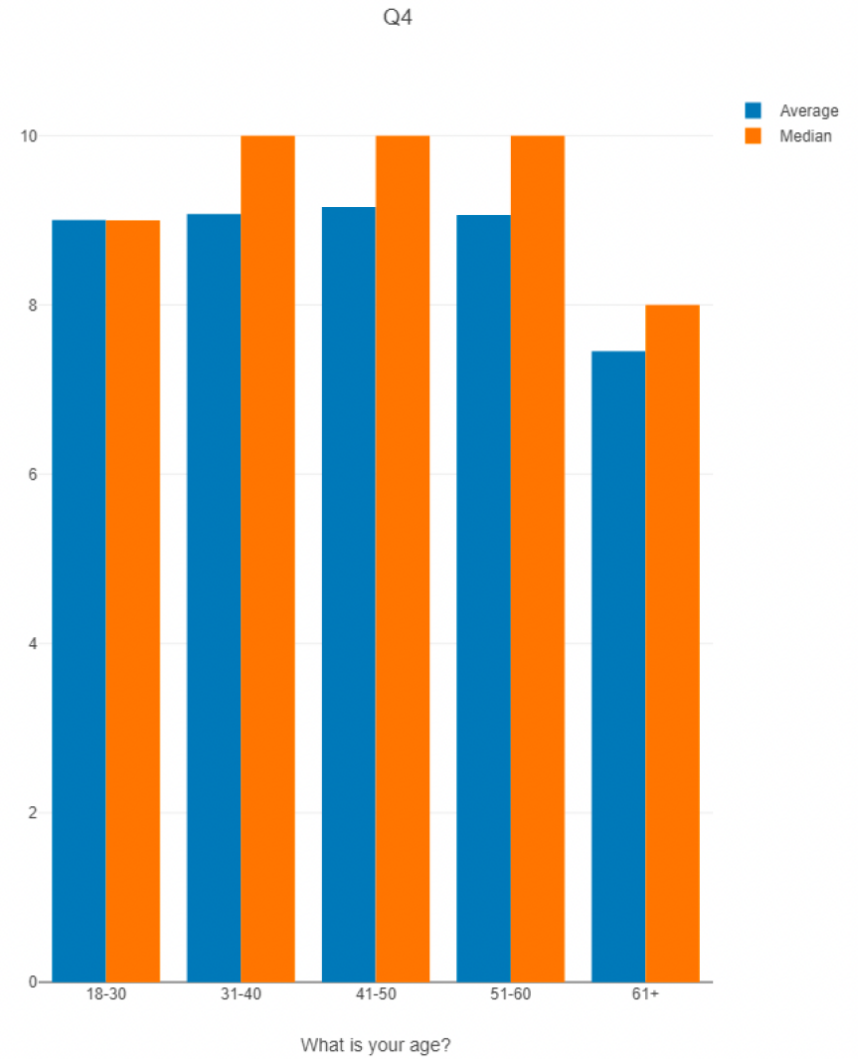


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 3 (Age)

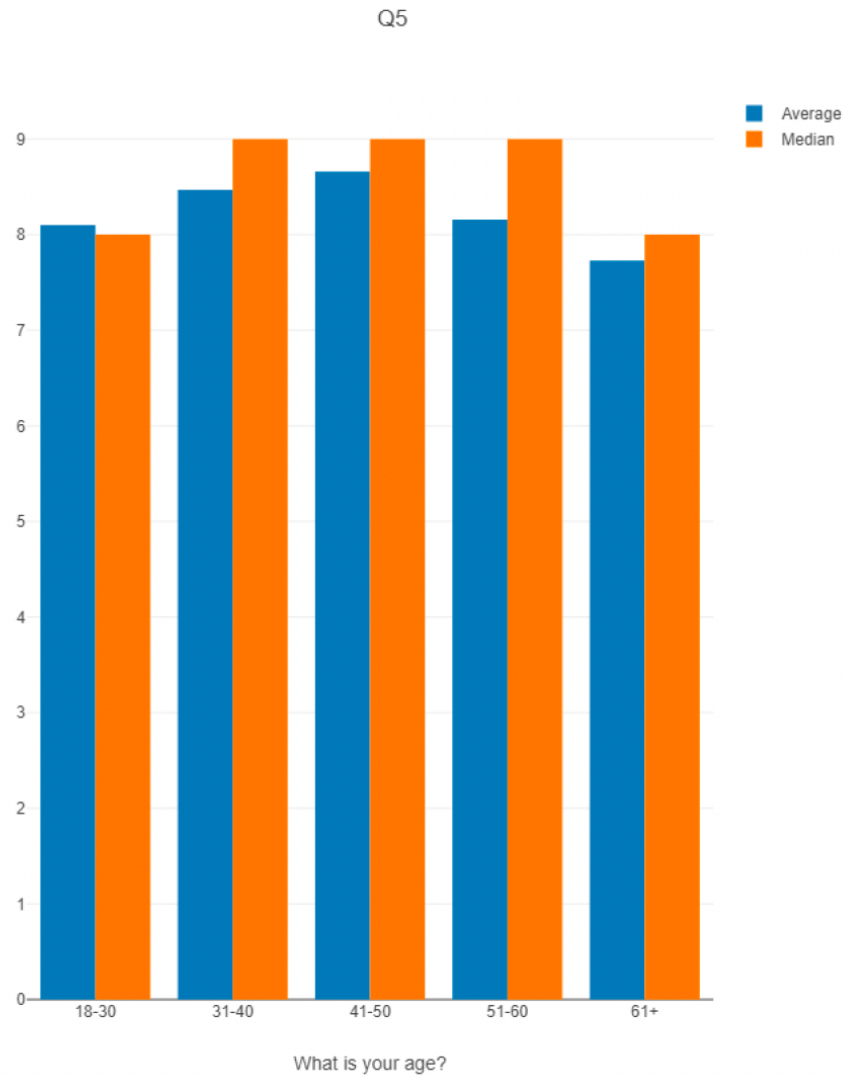


Average and median data of Question 4 (Age)

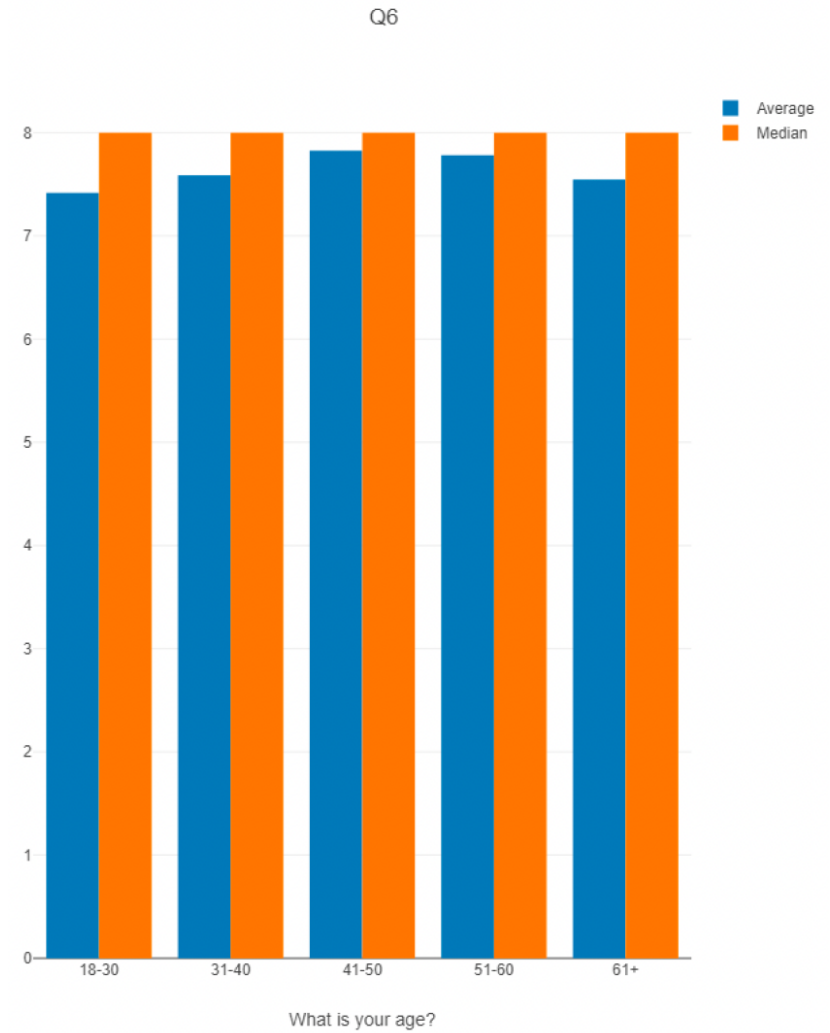


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 5 (Age)

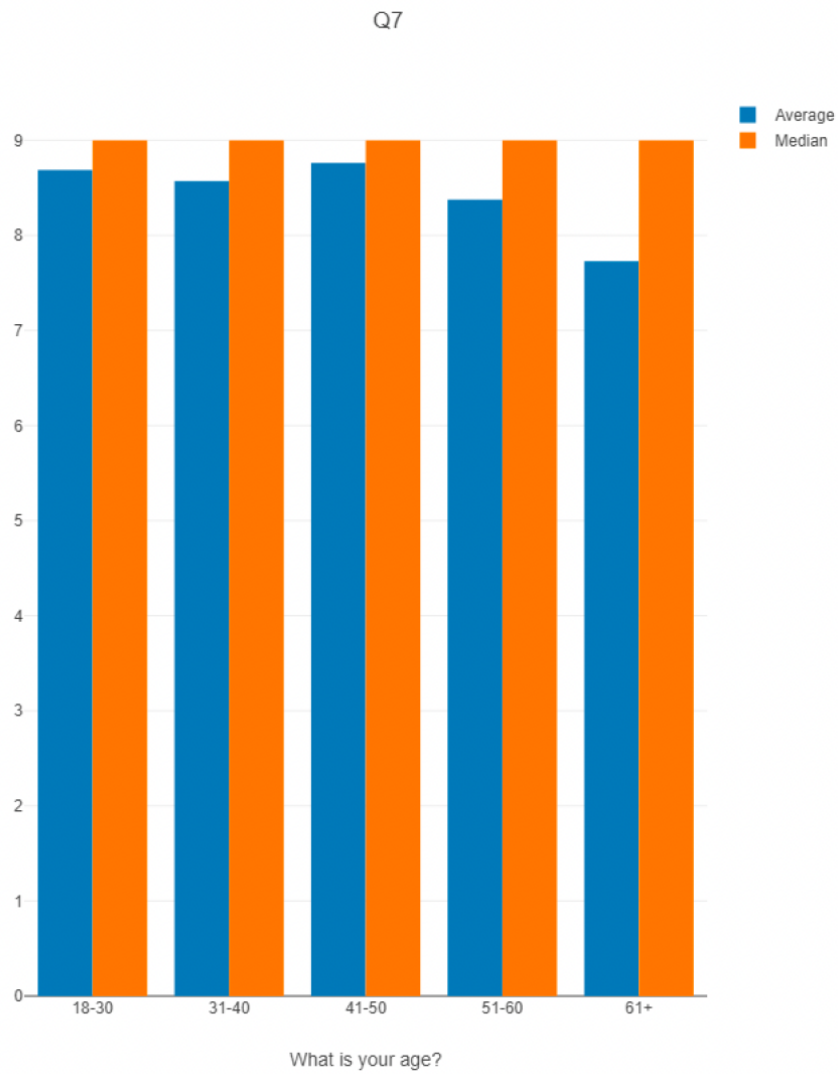


Average and median data of Question 6 (Age)

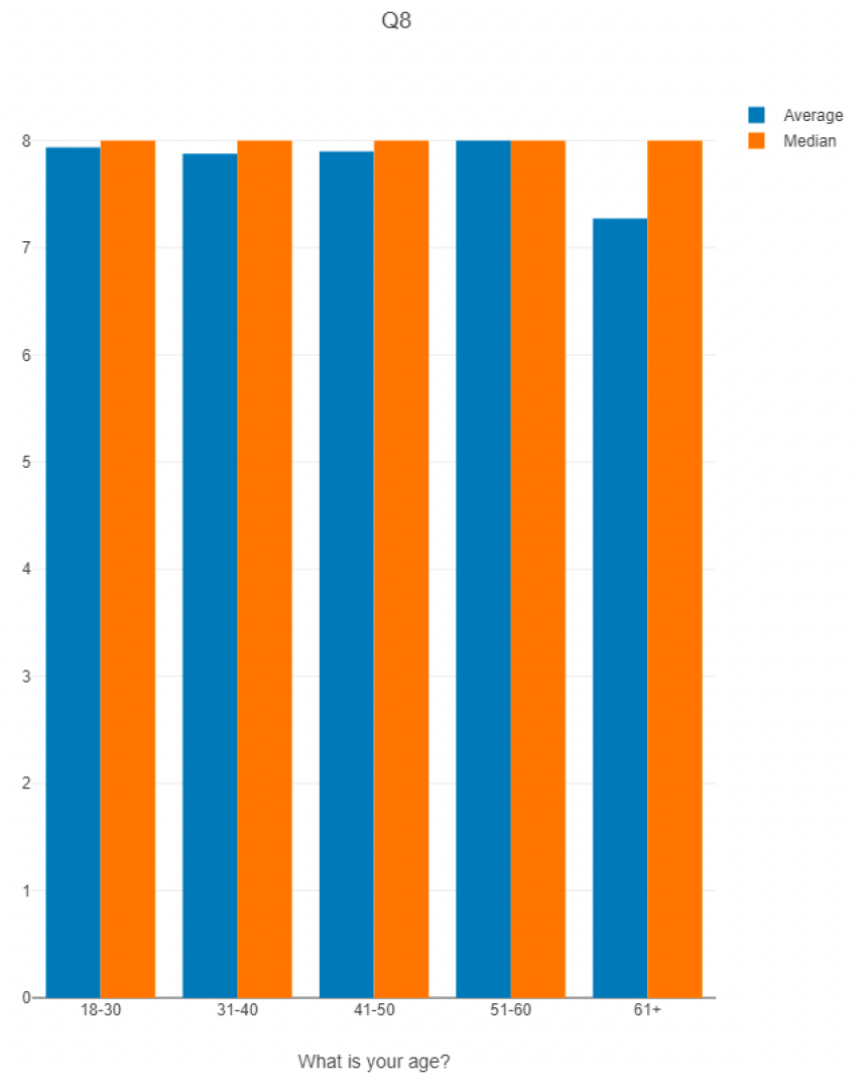


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 7 (Age)

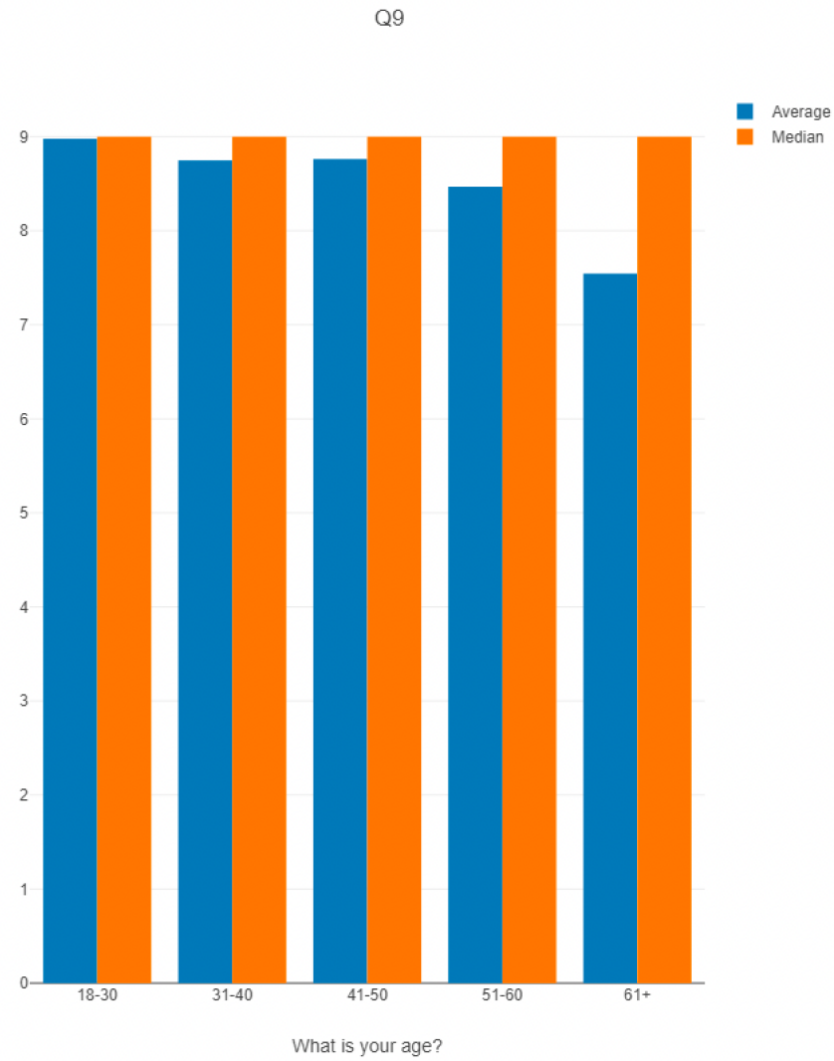


Average and median data of Question 8 (Age)

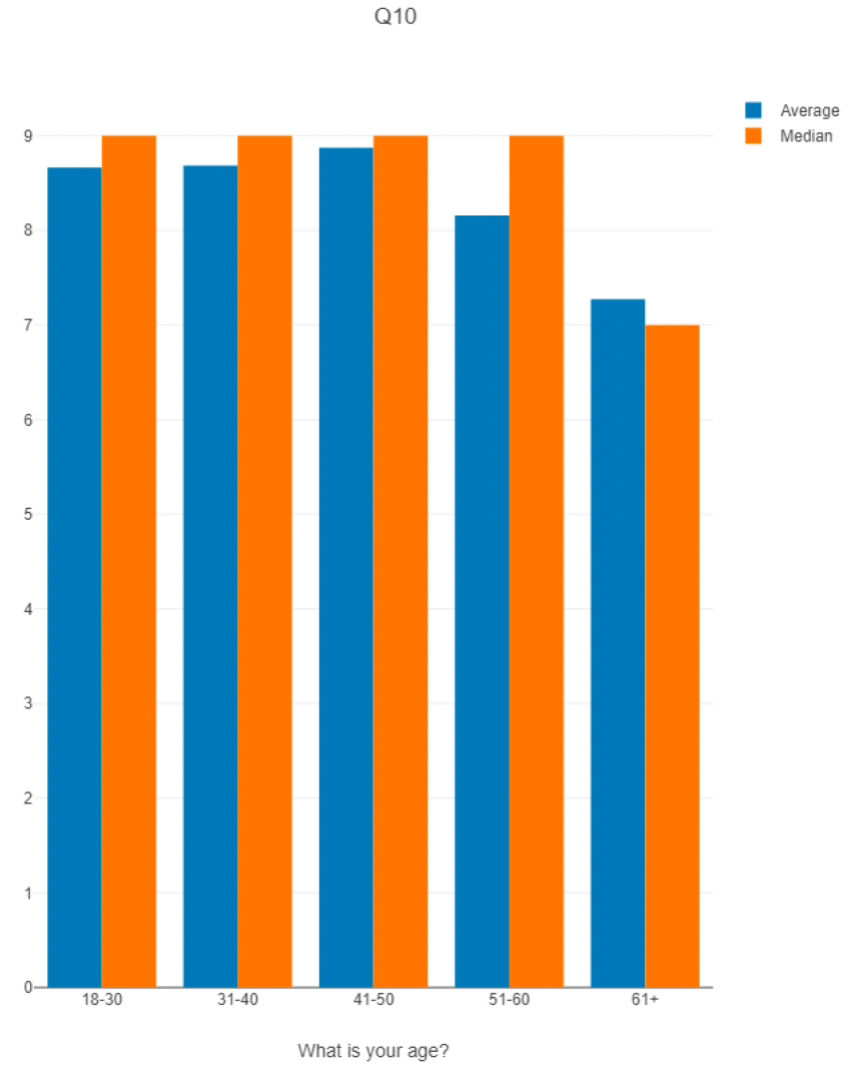


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 9 (Age)

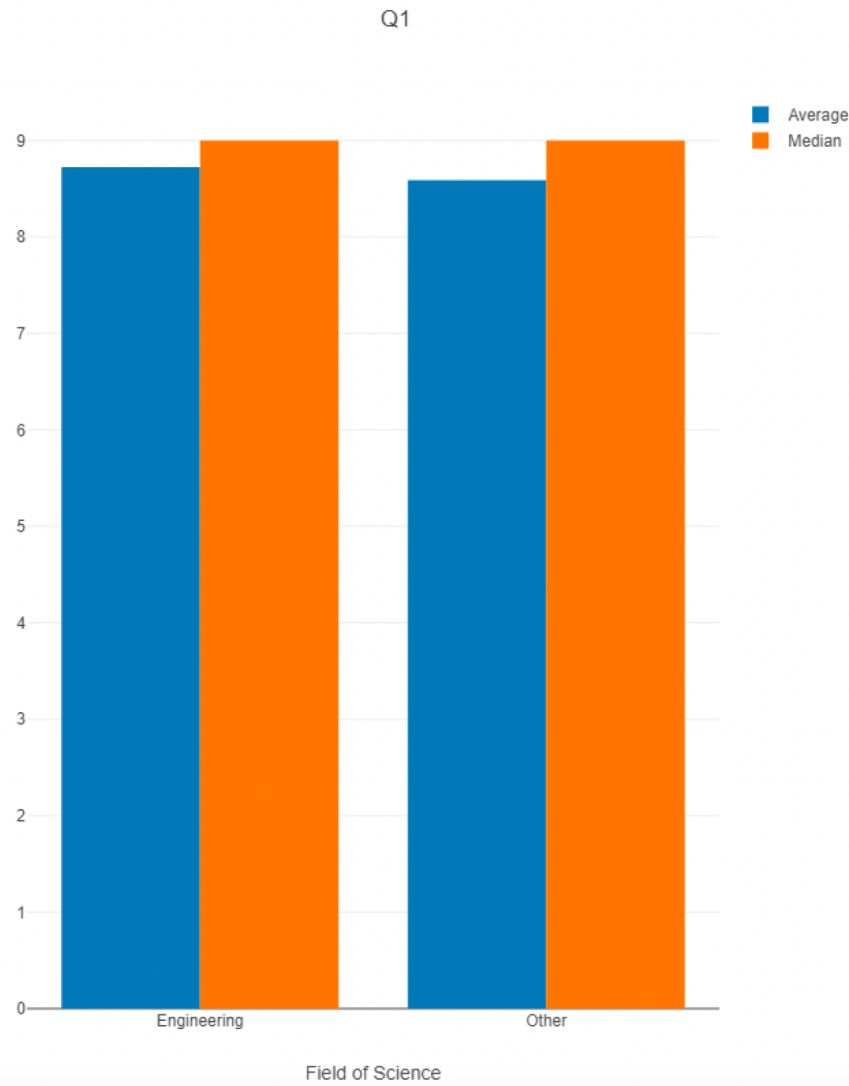


Average and median data of Question 10 (Age)

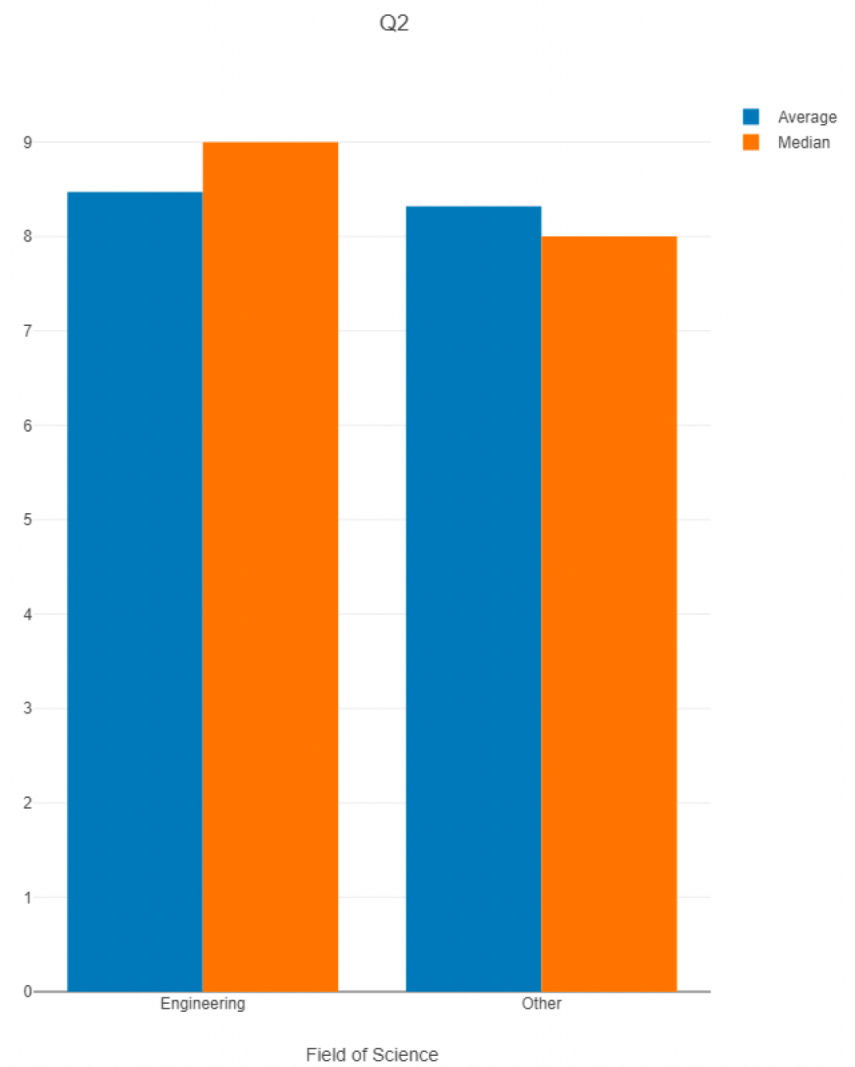


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 1 (Education)

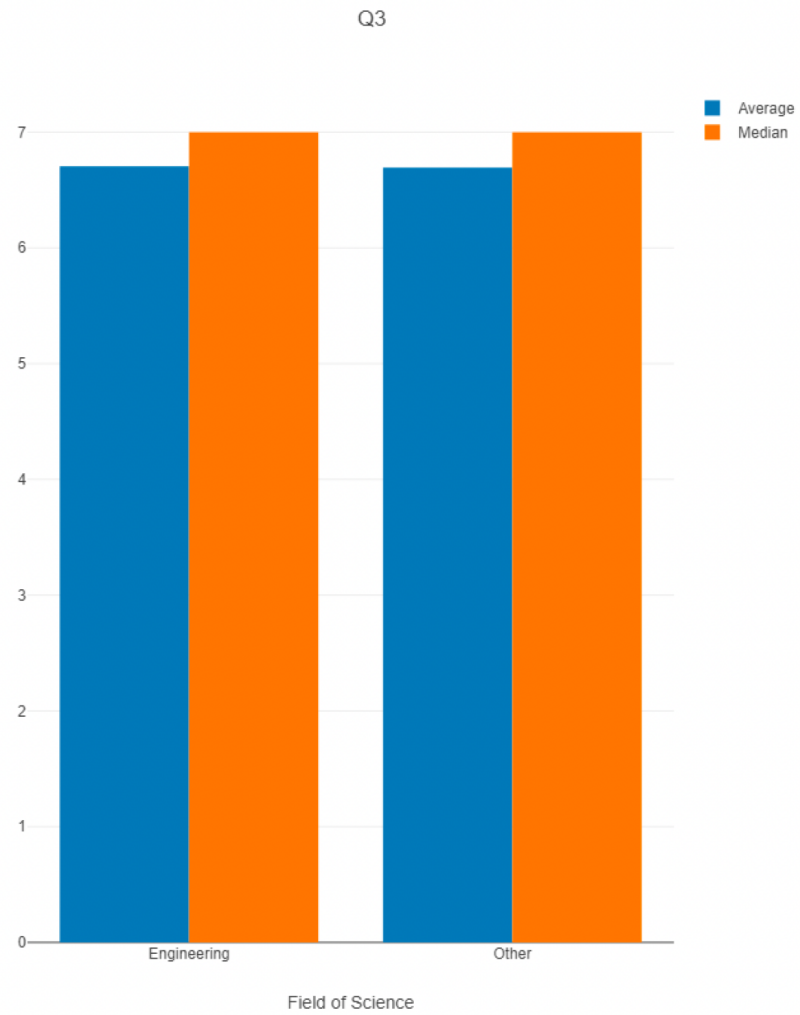


Average and median data of Question 2 (Education)

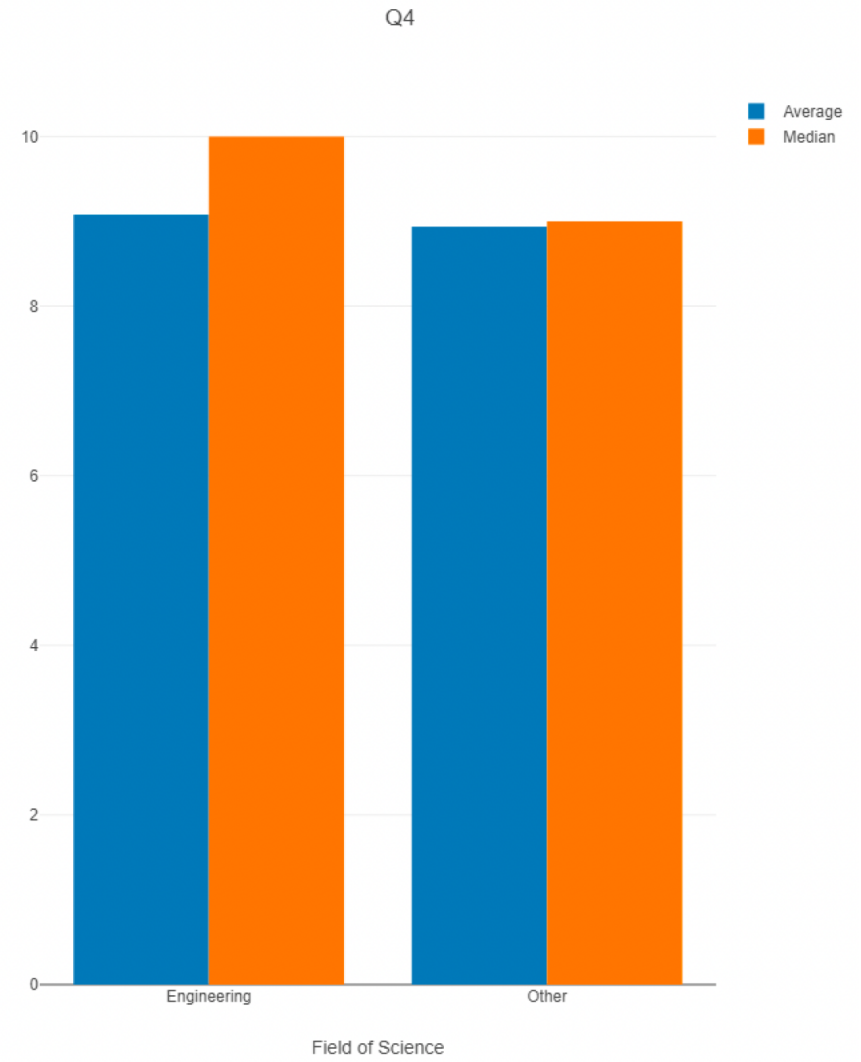


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 3 (Education)

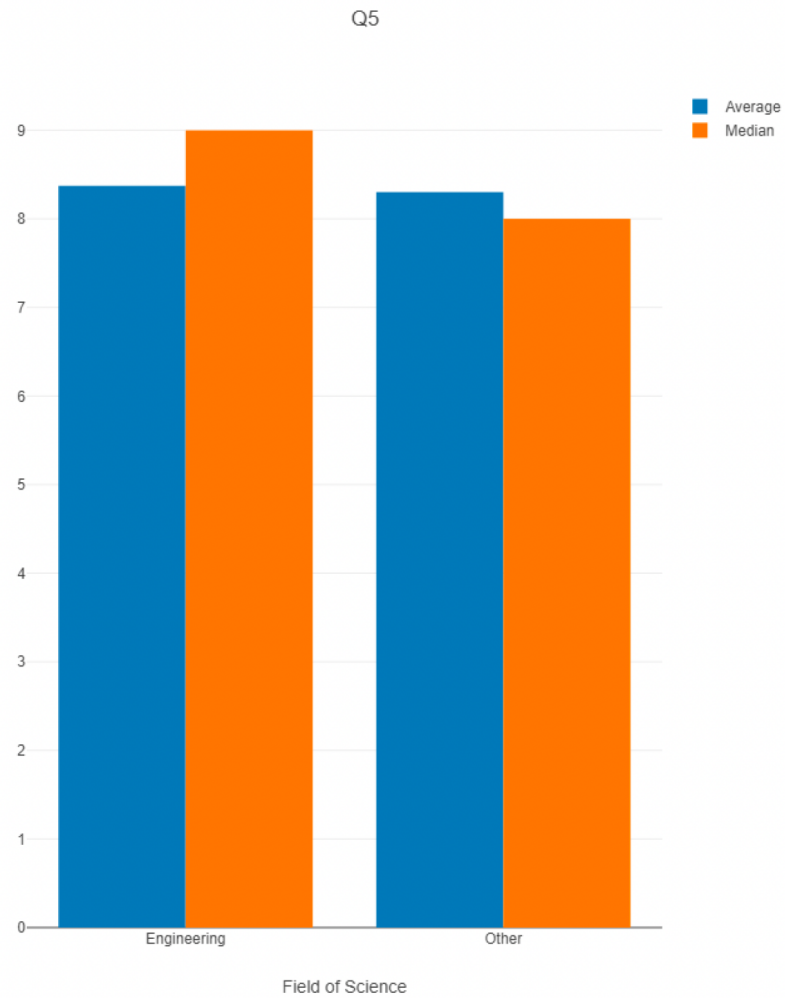


Average and median data of Question 4 (Education)

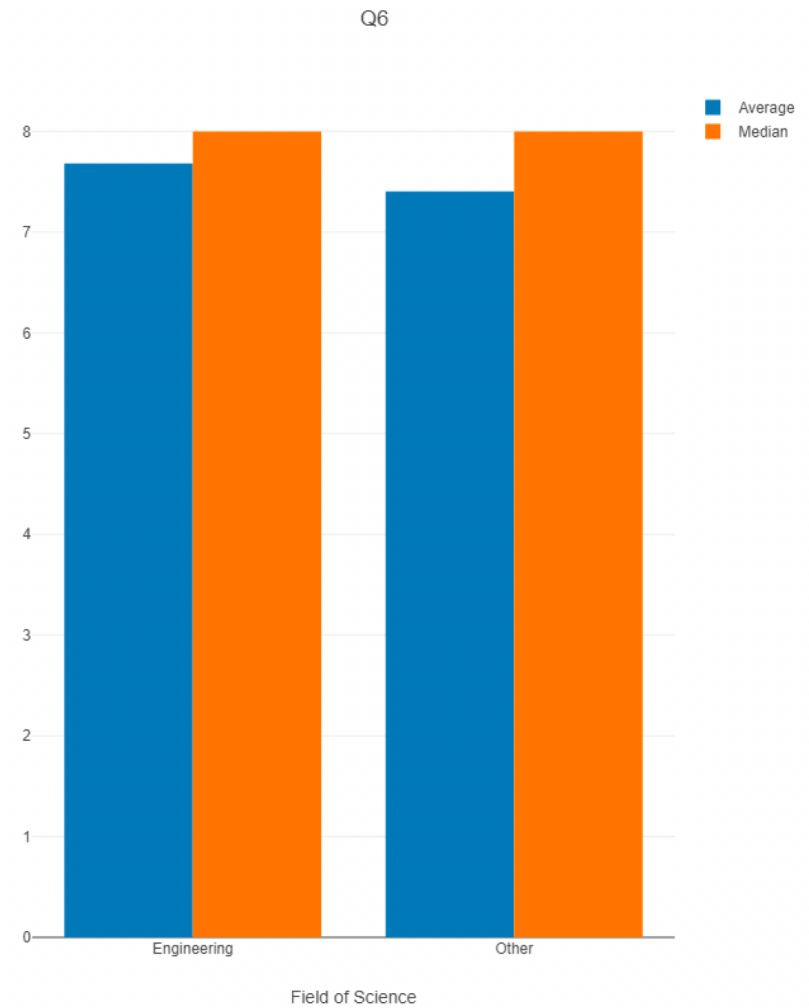


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 5 (Education)

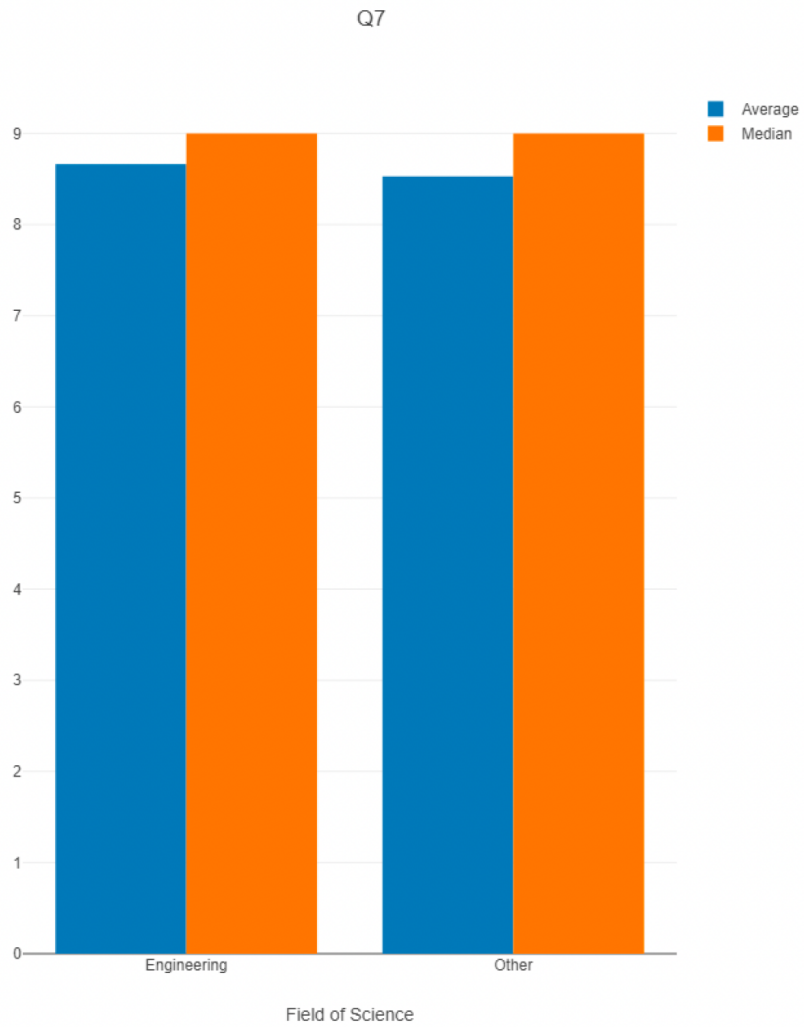


Average and median data of Question 6 (Education)

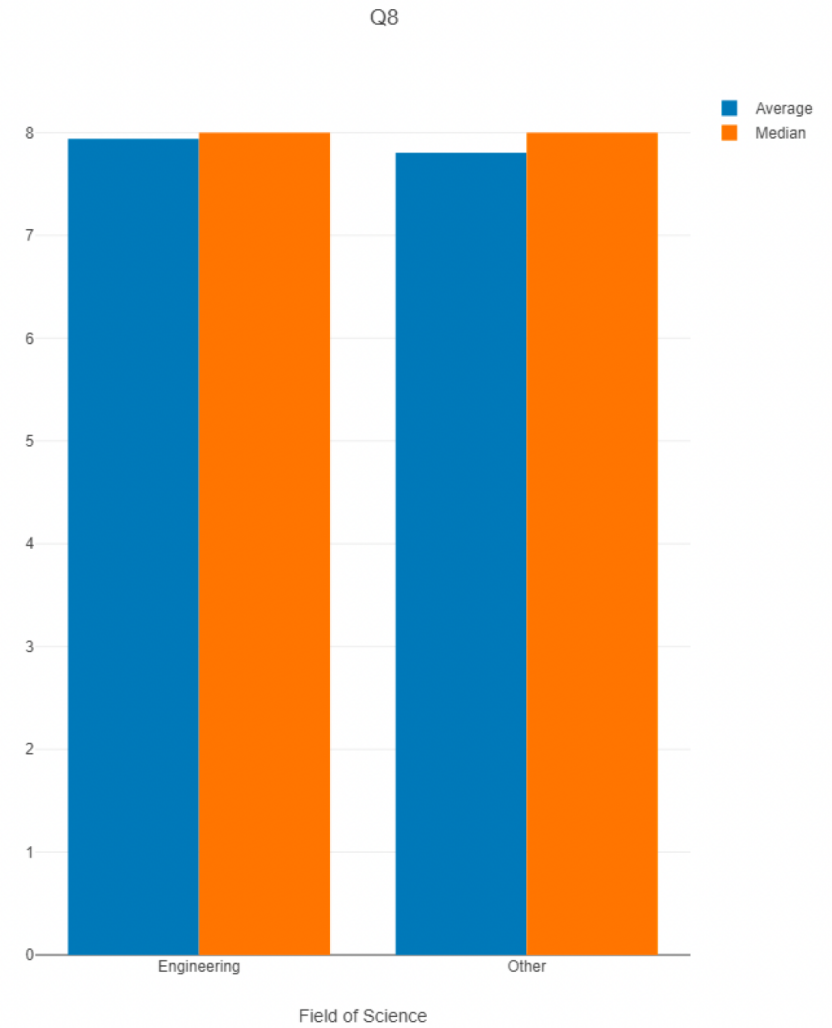


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 7 (Education)

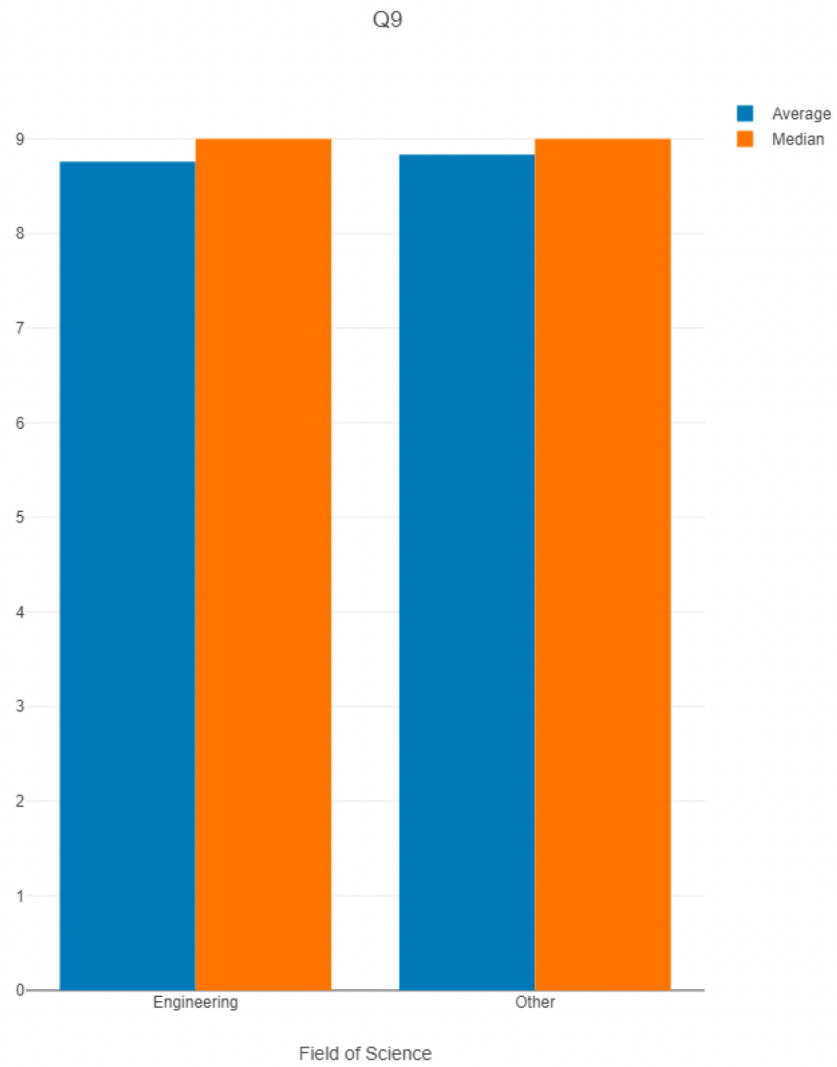


Average and median data of Question 8 (Education)

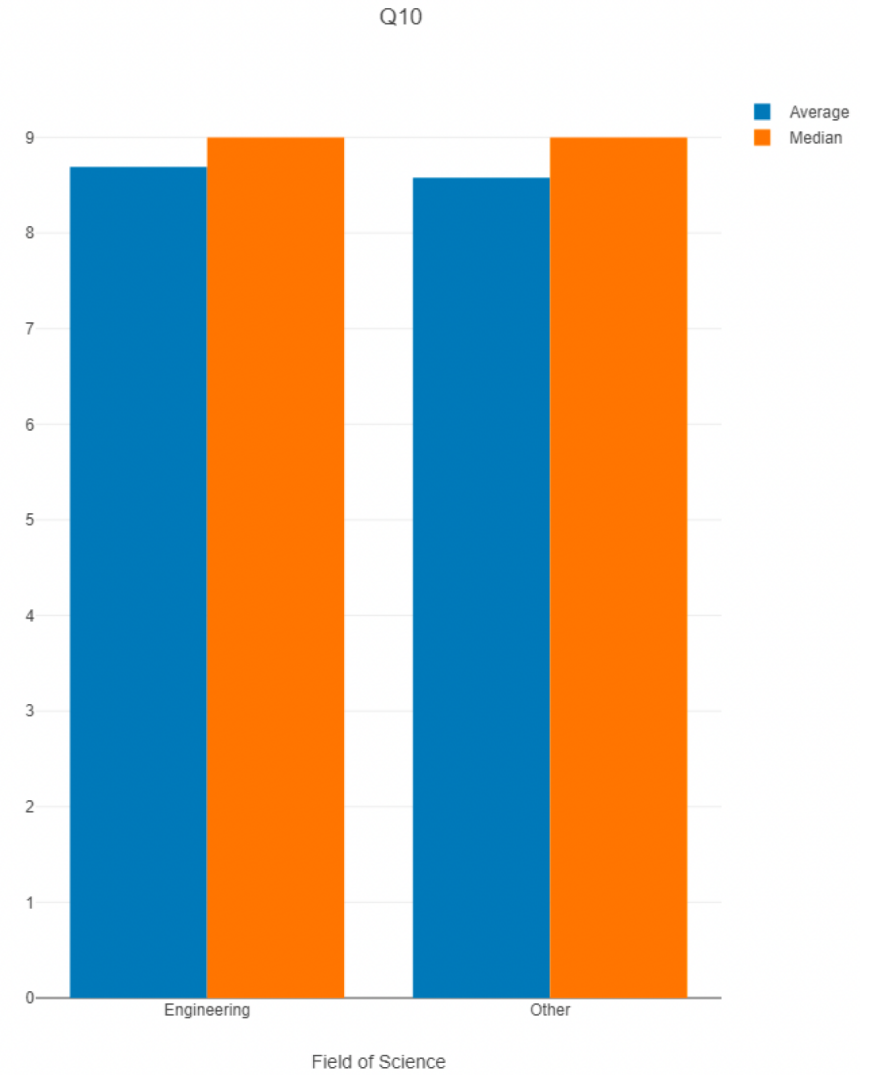


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of Question 9 (Education)

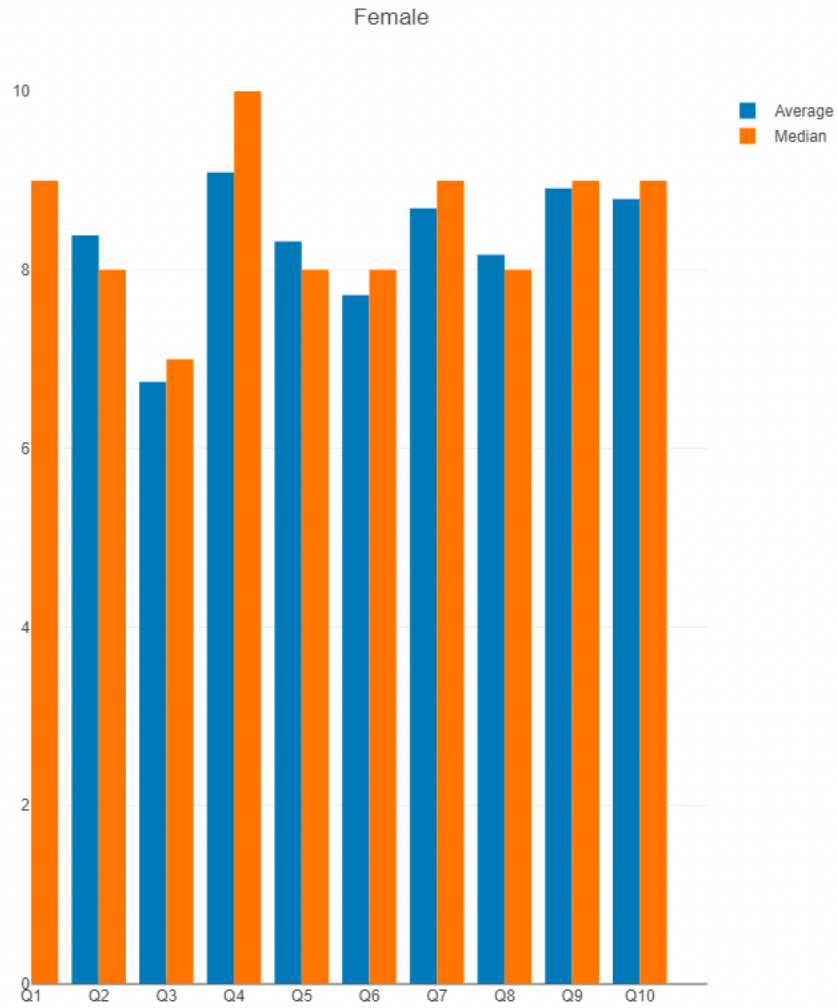


Average and median data of Question 10 (Education)

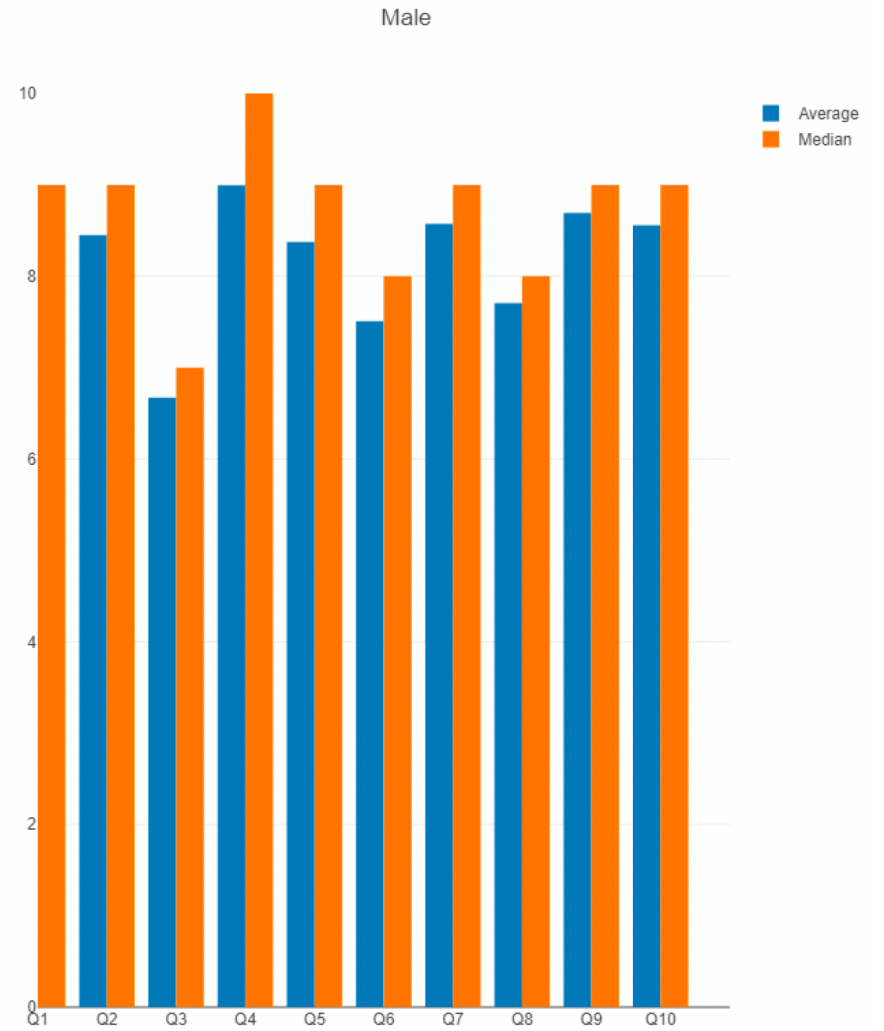


APPENDIX 4 CONTINUED
Alteryx software analysis data

Average and median data of all Questions (Female)



Average and median data of all Question (Male)



**APPENDIX 5
Questionnaire results**

1. How important are corporate values, the corporate goals and clear strategy for the company and its employees?	2. How important is the alignment of the employees personal goals with corporate goals of the company?	3. Please evaluate which organizational structure suits better the flat and flexible or hierarchical and rigid?	4. How important is a cross departments cooperation in the company? Please, evaluate on a scale from 1 to 10! 1 = not relevant at all 10 = highly relevant	5. Please provide your opinion whether a quick and rapid decisions making process in the company is important? Please, evaluate on a scale from 1 to 10! 1 = not important at all 10 = highly important	6. Do you think that high level of bureaucracy (instructions, approvals, limits, paper work and etc.) slow down the development of the company and harm its operations? Please, evaluate on a scale from 1 to 10! 1 = disagree completely 10 = agree completely	7. How important is support in implementation of employees initiatives and ideas from the company? Please, evaluate on a scale from 1 to 10! 1 = not important at all 10 = highly important	8. Do you think that work in nonhierarchical (flat) organization with good cooperation of cross-functional teams, will motivate people to develop passion to work and to become more engaged? Please, evaluate on a scale from 1 to 10! 1 = disagree completely 10 = agree completely	9. How important is a usage of modern software (planning, design, quality control and etc) in the construction industry? Please, evaluate on a scale from 1 to 10! 1 = not relevant at all 10 = highly relevant	10. Should universities and construction industry develop much deeper cooperation? Please, evaluate on a scale from 1 to 10! 1 = cooperation is unnecessary 10 = cooperation is a must	What is your age? 1 answer possible	What is your gender? 1 answer possible	What is your position at work? State your answer below	Please, state your division / department / company! State your answer below	How much experience do you have in the construction industry? 1 answer possible	In which field of science have you obtained your education? 1 answer possible. If it is not engineering, then, please, state the field of science below by the option "Other"!
10	8	7	10	9	9	9	9	9	9	41 - 50	Female	HR department manager	HR	0 - 2 years	antropology
9	9	4	9	9	7	9	3	9	8	31 - 40	Male	Architect	Planning and design department	0 - 2 years	engineering
10	8	7	10	9	8	7	10	10	10	41 - 50	Female	Engineer	HVAC design	0 - 2 years	engineering
10	9	8	10	7	8	8	10	9	8	18 - 30	Female	Engineer	Water ans sewage design	1 - 2 years	engineering
9	8	5	10	7	7	8	7	10	10	31 - 40	Male	secretary	other	0 - 2 years	economics
4	7	3	6	8	5	5	7	7	7	51 - 60	Female	board member	board	0 - 2 years	business administration
9	10	10	10	10	10	10	10	10	9	31 - 40	Female	assistant	real estate	0 - 2 years	biology
10	9	5	9	8	9	9	8	9	10	31 - 40	Female	lecturer	university	0 - 2 years	engineering
10	10	7	4	10	10	10	8	10	10	31 - 40	Female	assistant	project manager	0 - 2 years	secondary school
5	9	5	9	5	9	9	5	9	5	31 - 40	Female	project coordinator	financing	5 - 10 years	business and finance
9	9	8	9	9	9	9	9	10	10	31 - 40	Female	financial controller	administration	2 - 5 years	business administration
10	9	7	9	8	10	9	10	8	7	18 - 30	Female	secretary	birth leave	0 - 2 years	business administration
7	7	8	8	7	9	7	8	8	7	31 - 40	Female	assistant	administration	0 - 2 years	business administration
9	9	8	9	9	7	9	9	9	9	61 and more	Female	board member	board	5 - 10 years	business administration
8	8	7	9	8	8	7	6	9	8	18 - 30	Female	project manager	marketing	5 - 10 years	business administration
9	9	8	9	9	8	9	8	9	8	18 - 30	Female	IT specialist	it department	2 - 5 years	business administration
9	9	8	9	9	8	9	8	9	8	18 - 30	Female	manager	administration	2 - 5 years	business administration
7	8	5	8	7	10	10	9	10	10	18 - 30	Female	procurement manager	procurement department	0 - 2 years	engineering
9	10	8	10	8	8	8	9	10	8	18 - 30	Female	assistant	project	0 - 2 years	business administration
9	9	7	10	10	7	9	7	9	10	31 - 40	Female	Marketing director	marketing department	10 - 20 years	business administration
9	9	8	9	8	9	10	10	9	9	31 - 40	Female	project manager	IT	2 - 5 years	business administration
10	8	8	10	10	10	10	10	8	8	31 - 40	Female	senior engineer	technical department	5 - 10 years	engineering
10	10	6	10	9	10	10	8	10	10	31 - 40	Female	senior specialist	hr department	2 - 5 years	human resources
9	8	7	10	6	5	8	9	10	8	18 - 30	Male	not engineer	self employed	0 - 2 years	other
8	9	6	10	8	10	8	10	9	8	18 - 30	Female	engineer	pensioner	20 - 30 years	engineering
8	8	9	10	6	8	9	10	10	10	31 - 40	Female	procurement manager	procurement department	10 - 20 years	engineering
10	5	8	10	10	10	9	10	10	10	18 - 30	Female	secretary	administration	5 - 10 years	engineering
8	9	8	8	9	7	9	10	9	9	18 - 30	Female	concrete lorry driver	transport	5 - 10 years	secondary school
8	10	7	10	6	8	10	8	10	10	18 - 30	Male	warehouse keeper	warehouse	5 - 10 years	engineering
9	9	4	9	9	8	9	9	9	9	41 - 50	Male	welding engineer	construction	10 - 20 years	engineering
10	9	8	10	9	9	9	8	10	10	18 - 30	Female	procurement manager	tender department	2 - 5 years	social science
10	8	8	9	5	9	9	10	7	8	18 - 30	Female	assitant	financial dept	2 - 5 years	social science
10	10	7	10	7	8	8	10	10	10	31 - 40	Male	procurement manager	mārketing	5 - 10 years	social science
9	10	3	10	10	2	10	9	10	8	18 - 30	Female	office administration	administration	5 - 10 years	social science
9	9	7	7	10	8	10	10	10	10	18 - 30	Female	student	university	5 - 10 years	engineering
10	8	5	8	7	9	8	7	9	9	18 - 30	Female	designer	new product dept	5 - 10 years	engineering
6	7	5	8	7	6	7	5	7	7	18 - 30	male	health and safety	construction	5 - 10 years	engineering
6	8	9	9	9	10	9	10	8	9	18 - 30	Female	health and safety	technical department	0 - 2 years	engineering
8	9	8	9	7	9	8	9	9	9	18 - 30	Female	IT specialist	it	0 - 2 years	engineering
8	8	5	10	10	8	10	5	10	10	31 - 40	Male	laboratory specialist	rtu	0 - 2 years	engineering
10	10	9	10	8	10	9	10	9	9	41 - 50	Female	consultant	PR	5- 10 years	social science
8	8	8	9	6	8	8	9	7	8	41 - 50	Female	self employed		5 - 10 years	engineering
9	8	9	8	10	9	9	10	10	8	18 - 30	Male	designer	designer	5 - 10 years	engineering
10	9	8	10	9	10	9	9	10	9	18 - 30	Female	designer	self employed	0 - 2 years	engineering
10	8	4	8	7	4	8	8	8	8	18 - 30	Female	Marketing	Marketing	0 - 2 years	social science
9	8	6	9	7	9	8	7	10	7	18 - 30	Female	Business development m	administration	10 - 15 years	engineering
8	8	5	10	8	7	8	7	9	8	31 - 40	Male	Specialist	regional branch	0 - 2 years	economics
10	7	7	9	6	6	10	7	8	8	18 - 30	Male	shiftman		0 - 2 years	economics
8	8	5	10	10	7	8	6	10	10	18 - 30	Female	IT specialist	IT	5 - 10 years	social science
10	7	10	10	10	3	10	9	10	10	18 - 30	Female	bookkeeping	financial dept	2 - 5 years	economics
10	10	8	9	9	9	9	8	9	8	31 - 40	Female	head of procurement	procurement	5 - 10 years	economics
9	9	6	9	8	8	7	7	7	9	41 - 50	Female	analitics	technical department	0 - 2 years	economics

8	9	7	6	9	8	8	9	8	8	41 - 50	Male	procurement	procurement	2 - 5 years	economics
10	10	10	10	10	10	10	10	10	10	31 - 40	Male	assistant	administration	10 - 20 years	engineering
6	7	7	8	6	7	5	8	8	7	31 - 40	Female	self employed	self employed	0 - 2 years	economics
7	8	7	9	7	6	8	7	8	8	51 - 60	Female	senior specialist	technical department	10 - 20 years	economics
9	8	5	9	9	3	5	4	8	8	31 - 40	Female	board member	board	10 - 20 years	economics
8	8	8	8	9	9	9	9	8	9	41 - 50	Female	technical secretary	construction project	0 - 2 years	economics
10	9	5	9	10	9	8	8	10	8	31 - 40	Female	procurement manager	procurement	10 - 20 years	social science
10	10	6	10	10	10	10	7	10	10	41 - 50	Female	cfo	financial dept	0 - 2 years	economics
4	6	7	10	9	6	9	7	9	9	41 - 50	Male	quality assurance manager	quality assurance dept	10 - 20 years	economics
10	10	10	10	8	8	10	10	10	10	41 - 50	Male	Business development manager	administration	20 - 30 years	economics
7	9	6	9	8	4	7	7	8	8	31 - 40	Male	secretary	construction project	5 - 10 years	engineering
10	10	6	7	8	6	8	8	9	9	31 - 40	Female	bookkeeping	financial dept	0 - 2 years	economics
7	7	4	10	10	7	7	4	8	5	31 - 40	Male	secretary	construction project	0 - 2 years	economics
8	8	4	10	10	8	10	4	7	10	41 - 50	Female	manager	company	0 - 2 years	engineering
8	9	5	10	8	8	10	8	10	10	31 - 40	Female	coordinator	telecommunication	5 - 10 years	engineering
9	8	8	8	10	5	10	7	10	10	31 - 40	Male	grāmatvede	IT	5 - 10 years	economics
7	4	4	7	8	7	8	7	8	9	18 - 30	Male	IT sistemu administrator	IT klientu apkalposana	5 - 10 years	economics
7	8	3	10	7	8	9	8	9	7	31 - 40	Male	senior engineer	administration	10 - 20 years	engineering
8	10	4	10	9	8	7	4	10	7	18 - 30	Male	retired	retired	20 - 30 years	engineering
8	10	2	10	10	1	10	5	8	10	31 - 40	Male	self employed	self employed	10 - 20 years	other
10	8	7	8	10	7	8	8	9	8	31 - 40	Male	head of department	construction	10 - 20 years	engineering
10	9	6	10	7	8	8	8	10	10	41 - 50	Female	secretary	secretary	0 - 2 years	medical
9	9	8	10	10	8	10	10	8	10	51 - 60	Male	translator	tax authority	20 - 30 years	philology
1	2	4	7	8	2	3	3	4	3	31 - 40	Male	employee	IT	5 - 10 years	computer science
9	9	9	10	10	10	10	9	10	9	41 - 50	Female	tender department manager	tender department	10 - 20 years	legal science
10	10	10	10	10	10	10	10	10	10	41 - 50	Female	tender department specialist	tender department	2 - 5 years	social science
9	9	7	10	8	4	10	9	9	9	41 - 50	Female	secretary	museum	10 - 20 years	philology
8	9	5	9	7	9	9	8	9	10	31 - 40	Female	administrator	administration	0 - 2 years	social science
10	8	8	8	8	9	7	9	10	9	41 - 50	Female	coordinator	slepens	0 - 2 years	philosophy
10	9	3	10	8	8	9	5	10	10	31 - 40	Female	technical director	technical department	10 - 20 years	engineering
7	8	4	10	9	3	9	3	9	10	31 - 40	Male	secretary	pr	10 - 20 years	finance
3	5	4	8	8	10	7	5	6	6	41 - 50	Female	sales specialist	sales	10 - 20 years	finance
8	6	7	8	9	4	6	9	9	8	18 - 30	Female	project manager	construction	5 - 10 years	engineering
8	10	10	8	10	10	10	7	10	5	18 - 30	Male	cfo	financial dept	0 - 2 years	finance
10	7	7	9	8	6	8	10	9	10	31 - 40	Male	bookkeeping	financial dept	2 - 5 years	finance
8	8	10	10	10	1	8	10	9	9	31 - 40	Female	cfo	financial dept	2 - 5 years	finance
10	10	5	10	10	8	10	10	5	6	31 - 40	Male	financial controller	planning department	10 - 20 years	engineering
9	9	5	8	7	5	7	7	6	10	31 - 40	Male	deputy	technical department	10 - 20 years	engineering
10	8	8	10	9	8	9	9	10	10	51 - 60	Male	secretary	administration	30 - 40 years	secondary school
8	7	9	6	8	9	8	10	8	10	41 - 50	Male	bookkeeping	financial dept	30 - 40 years	finance
10	10	9	8	10	7	9	8	9	10	18 - 30	Male	bookkeeping assistant	financial dept	5 - 10 years	finance
10	8	8	9	7	9	10	8	8	8	18 - 30	Male	retired	retired	20 - 30 years	engineering
6	7	9	9	8	9	8	7	7	9	31 - 40	Male	self employed	self employed	10 - 20 years	engineering
10	9	9	10	10	8	10	10	9	7	31 - 40	Male	bookkeeping	financial dept	10 - 20 years	finance
9	10	8	9	8	10	7	6	9	6	61 and more	Male	head of department	bookkeeping	30-40 years	finance
9	9	10	10	10	8	8	8	8	9	41 - 50	Male	wage analitic	hr	10 - 20 years	business administration
9	10	7	8	10	5	8	8	6	9	41 - 50	Female	bookkeeping	financial dept	5 - 10 years	finance
9	8	10	7	9	7	7	5	9	9	41 - 50	Male	bookkeeping assistant	financial dept	20 - 30 years	finance
8	7	5	8	5	7	8	6	8	8	31 - 40	Male	warehouse manager		5 - 10 years	engineering
10	10	8	8	10	8	7	7	10	10	31 - 40	Male	deputy of the manager	sales	5 - 10 years	social science
9	10	10	10	10	5	10	10	10	9	31 - 40	Male	ceo	administration	20 - 30 years	engineering
5	5	5	5	5	5	5	5	5	5	31 - 40	Male	student	Latvijas Mākslas akadēmija	5 - 10 years	art
10	6	3	10	10	8	10	8	9	9	18 - 30	Female	project manager	pr	2 - 5 years	social science
7	7	4	10	10	5	9	8	10	10	41 - 50	Female	student		2 - 5 years	engineering
8	9	4	9	8	7	8	8	9	10	41 - 50	Male	project manager	construction	10 - 20 years	engineering
10	10	2	10	2	7	5	4	8	8	31 - 40	Male	designer	self employed	10 - 20 years	art
8	6	5	8	10	6	8	10	10	8	31 - 40	Male	project manager	communication	10 - 20 years	social science
8	8	2	9	8	10	10	7	8	7	31 - 40	Male	study process responsible	hr	10 - 20 years	social science
8	10	7	8	10	10	10	6	10	8	18 - 30	Male	self employed	self employed	2 - 5 years	it science
4	5	6	10	8	10	10	9	7	10	31 - 40	Female	designer	design dept	2 - 5 years	engineering
8	7	6	9	10	10	8	5	7	6	31 - 40	Male	insurance and warranty manager	financial dept	2 - 5 years	engineering
8	9	8	9	8	7	7	7	8	8	41 - 50	Male	designer	self employed	20 - 30 years	engineering
9	8	3	8	9	8	8	5	9	9	51 - 60	Male	designer	design dept	20 - 30 years	engineering
8	8	3	9	10	8	10	4	8	4	41 - 50	Male	HR admin	HR	20 - 30 years	International business
8	9	3	10	10	9	9	6	10	10	31 - 40	Male	iso manager	quality assurance dept	10 - 20 years	engineering
8	9	3	9	10	8	9	6	9	9	31 - 40	Male	technical secretary	construction project	10 - 20 years	engineering
10	10	6	9	10	1	8	5	8	10	31 - 40	Male	coach	school	10 - 20 years	engineering
3	6	6	10	8	9	9	7	8	10	18 - 30	Female	procurement	procurement	5 - 10 years	engineering
8	9	6	10	9	6	7	5	10	10	18 - 30	Male	administrator	shop	5 - 10 years	engineering

8	8	5	10	8	9	8	8	10	10	31 - 40	Male	human	Latvija	5 - 10 years	engineering
9	8	3	10	8	3	8	7	8	8	31 - 40	Female	chief administrator	administration	5 - 10 years	engineering
8	7	4	10	8	10	8	7	10	10	18 - 30	Male	senior engineer	self employed	20 - 30 years	engineering
8	7	5	8	8	8	5	7	5	8	18 - 30	Male	engineer	quality assurance dept	2 - 5 years	engineering
9	7	8	6	9	5	8	7	8	5	18 - 30	Male	self employed		10 - 20 years	engineering
9	9	9	10	10	6	10	7	10	10	31 - 40	Male	coach	coach	2 - 5 years	engineering
10	10	6	10	5	10	10	10	7	10	41 - 50	Male	foreman assistant	Civil projects departament	20 - 30 years	engineering
10	10	8	10	7	9	10	10	10	10	51 - 60	Male	draftsman	engineering department	30 - 40 years	engineering
9	8	6	10	9	8	8	8	7	10	31 - 40	Male	Student	Būvniecība	20 - 30 years	engineering
10	10	3	10	10	8	7	7	5	10	41 - 50	Male	draftsman	design group	10 - 20 years	engineering
8	6	9	9	9	6	9	10	10	8	41 - 50	Male	contractor		20 - 30 years	engineering
6	9	8	10	10	7	10	10	10	3	51 - 60	Male	deputy of the depstrment	Departament	2 - 5 years	engineering
8	10	6	10	10	10	10	8	10	10	51 - 60	Male	a	a	5 - 10 years	engineering
8	8	6	8	6	6	8	8	7	8	18 - 30	Male	Student	RSU	0 - 2 years	engineering
9	9	6	10	7	7	8	8	9	8	18 - 30	Female	Maģistrants	RTU IEVF	0 - 2 years	engineering
10	7	6	10	6	10	8	6	10	10	31 - 40	Male	CO		0 - 2 years	engineering
10	10	6	10	7	5	10	10	10	9	41 - 50	Female	asistents	construction	0 - 2 years	engineering
8	10	8	9	10	8	9	8	9	8	31 - 40	Male	sales specialist	sales	2 - 5 years	engineering
10	3	10	10	8	3	9	10	10	7	18 - 30	Male	programmer	IT	10 - 20 years	engineering
8	7	6	9	7	8	8	7	8	8	31 - 40	Male	programmer		5 - 10 years	engineering
8	10	7	10	10	10	7	5	10	8	41 - 50	Male	designer	design dept	10 - 20 years	engineering
10	10	10	10	10	10	10	10	10	10	31 - 40	Female	head of department	logistics	0 - 2 years	engineering
9	9	9	10	7	7	7	6	8	2	51 - 60	Male	suport specialist	networks dept	5 - 10 years	engineering
9	9	5	10	10	8	10	8	9	9	31 - 40	Female	junior engineer		0 - 2 years	engineering
10	10	3	10	10	10	9	10	8	5	18 - 30	Female	Student	Student	0 - 2 years	engineering
9	9	8	9	7	10	8	9	7	8	31 - 40	Male	lectorer	transport	0 - 2 years	engineering
9	9	10	10	10	9	10	10	10	10	51 - 60	Male	programmer	IT	10 - 20 years	engineering
7	7	7	7	7	7	7	7	7	7	61 and more	Male	constructin worker	construction	0 - 2 years	engineering
10	7	5	8	8	5	8	8	10	7	18 - 30	Male	Designer	Marketing	2 - 5 years	engineering
10	7	7	8	5	9	7	10	10	10	18 - 30	Female	project manager		10 - 20 years	engineering
10	10	9	9	9	8	10	10	10	10	41 - 50	Male	CEO	not costruction	10 - 20 years	engineering
9	9	9	9	9	10	10	9	9	9	51 - 60	Male	Student	RTU	2 - 5 years	engineering
10	10	10	10	10	10	10	10	10	10	51 - 60	Male	draftsman	construction project	2 - 5 years	engineering
10	10	10	10	10	10	10	10	10	10	51 - 60	Male	Mārketing	marketing	2 - 5 years	engineering
9	9	6	9	9	8	8	9	8	8	41 - 50	Male	IT specialist	Security deptment	10 - 20 years	engineering
7	8	8	9	9	3	9	8	8	8	41 - 50	Male	Specialist	Bank	10 - 20 years	engineering
8	8	5	9	8	7	8	8	8	8	31 - 40	Female	technology engineer	-	0 - 2 years	engineering
9	8	7	9	8	10	9	8	8	8	41 - 50	Male	IT project manager	management	0 - 2 years	engineering
10	10	7	8	5	10	10	10	7	8	18 - 30	Male	foreman	construction	0 - 2 years	engineering
5	5	5	5	6	5	6	5	6	5	18 - 30	Male	worker	construction	0 - 2 years	engineering
7	6	6	6	7	5	9	7	8	9	41 - 50	Male	head of brigade	road dept	2 - 5 years	engineering
9	9	6	9	9	4	8	6	10	10	18 - 30	Male	worker	road dept	0 - 2 years	engineering
7	8	7	10	10	8	10	9	10	10	18 - 30	Female	self employed	self employed	0 - 2 years	engineering
10	10	4	10	10	10	9	10	8	6	31 - 40	Male	Board	board	5 - 10 years	engineering
8	10	10	10	10	10	8	10	10	10	31 - 40	Male	commercial manager	commercial department	2 - 5 years	engineering
10	10	5	10	8	7	10	7	10	10	41 - 50	Male	project manager	Business development	20 - 30 years	engineering
9	8	8	10	9	10	8	8	8	8	51 - 60	Male	board member	board	20 - 30 years	engineering
8	9	8	9	10	10	8	8	8	9	31 - 40	Female	board member	board	5 - 10 years	engineering
8	8	6	9	8	6	9	7	6	8	31 - 40	Male	project manager	construction	10 - 20 years	engineering
10	8	8	8	8	5	7	7	8	8	18 - 30	Male	foreman	construction	2 - 5 years	engineering
4	9	3	9	9	8	5	9	4	7	41 - 50	Male	construction project man	civil construction dept	20 - 30 years	engineering
9	8	8	9	9	10	10	8	9	8	41 - 50	Female	project manger	technical department	10 - 20 years	engineering
7	5	5	10	6	3	7	6	7	10	31 - 40	Male	manager	technical department	10 - 20 years	engineering
9	7	5	10	8	9	7	8	9	8	31 - 40	Male	bim engineer	technical department	5 - 10 years	engineering
9	9	6	8	9	7	10	6	8	8	18 - 30	Male	structural engineer	technical department	5 - 10 years	engineering
9	10	8	10	9	9	9	10	8	8	18 - 30	Male	costs estimator	Infrastructure departaments	2 - 5 years	engineering
6	8	7	6	9	5	5	6	7	6	61 and more	Male	project manager	technical department	30 - 40 years	engineering
7	3	5	3	3	3	4	3	1	2	61 and more	Male	project manager	LNK Industries	40 years and mon	engineering
6	5	6	6	5	5	4	5	4	4	61 and more	Male	foreman		40 years and mon	engineering
10	9	9	10	10	10	10	10	10	10	18 - 30	Male	foreman	departament of thje civil	5 - 10 years	engineering
9	9	8	9	10	9	9	9	9	9	18 - 30	Male	civil engineer	technical department	5 - 10 years	engineering
10	10	9	9	10	9	10	9	9	9	31 - 40	Male	costs estimator	costs estimation dept	5 - 10 years	engineering
10	9	10	10	9	8	9	9	9	9	31 - 40	Male	construction project man	construction	5 - 10 years	engineering
8	8	6	10	9	10	9	10	10	8	18 - 30	Female	certified geodezists		0 - 2 years	engineering
10	8	8	10	10	9	10	9	9	10	31 - 40	Female	self employed	self employed	10 - 20 years	engineering
10	8	8	10	10	9	10	9	9	10	31 - 40	Female	employee	technical department	10 - 20 years	engineering
9	8	9	8	10	8	9	9	9	9	31 - 40	Female	director	technical department	5 - 10 years	engineering
8	8	6	9	9	8	8	6	9	10	41 - 50	Female	foreman	technical department	0 - 2 years	engineering
9	8	7	9	10	8	8	10	6	6	31 - 40	Female	bookkeeping	financial dept	5 - 10 years	engineering

7	9	3	10	8	9	9	7	6	9	41 - 50	Male	landscaping foreman	construction project	10 - 20 years	engineering
9	9	7	9	8	10	8	8	9	9	18 - 30	Male	foreman	construction	2 - 5 years	engineering
10	6	7	10	7	10	7	10	10	10	18 - 30	Male	condtruction worker	multistorey building	0 - 2 years	engineering
10	10	9	10	10	9	10	10	10	10	41 - 50	Male	employee	technical department	5 - 10 years	engineering
8	8	5	9	9	10	7	7	9	10	18 - 30	Female	manager	sales	0 - 2 years	engineering
8	7	8	10	9	10	8	8	9	10	41 - 50	Female	architect	design dept	0 - 2 years	engineering
9	8	6	10	8	9	9	8	8	8	31 - 40	Female	architect	Arhitect	0 - 2 years	engineering
9	8	3	10	9	10	10	6	10	10	51 - 60	Male	structural engineer	structural design	0 - 2 years	engineering
7	9	9	9	10	8	8	9	8	8	31 - 40	Female	manager	municipality	0 - 2 years	engineering
8	8	5	7	6	8	7	6	7	8	51 - 60	Female	foreman	construction	40 years and mor	engineering
9	9	10	6	8	7	8	10	8	9	31 - 40	Female	networks foreman	SIA "Baltic Construction Company (BCC)"	2 - 5 years	engineering
10	10	5	10	10	10	10	10	10	10	18 - 30	Female	foreman	construction project	2 - 5 years	engineering
10	9	7	10	10	10	10	8	9	8	31 - 40	Male	project manager	-	10 - 20 years	engineering
8	8	7	10	7	10	7	10	10	10	31 - 40	Female	technical supervisor	supervision dept	2 - 5 years	engineering
9	10	4	10	9	7	9	8	10	9	31 - 40	Female	structural engineer	design dept	2 - 5 years	engineering
10	10	7	10	9	7	9	8	9	8	31 - 40	Female	engineer	construction	5 - 10 years	engineering
8	8	8	10	9	6	8	9	8	9	18 - 30	Female	secretary	construction	0 - 2 years	engineering
8	7	5	10	10	6	7	5	9	10	41 - 50	Male	lawyer	legal dept	10 - 20 years	engineering
6	8	8	8	7	10	8	9	9	10	31 - 40	Female	foreman	road dept	5 - 10 years	engineering
9	9	10	8	10	10	10	10	9	9	41 - 50	Male	Board	construction	10 - 20 years	engineering
9	8	6	10	9	9	9	8	9	9	41 - 50	Female	foreman assistant	department of thje civil construction projects	0 - 2 years	engineering
9	9	9	9	9	7	9	7	7	8	31 - 40	Male	project manager	IT	10 - 20 years	engineering
10	3	5	10	7	10	10	10	10	8	31 - 40	Female	foreman	ifrastructure projects	2 - 5 years	engineering
9	10	7	10	5	10	9	10	10	7	41 - 50	Male	project manager	projects	20 - 30 years	engineering
10	10	8	10	9	10	8	10	7	9	18 - 30	Female	project manager	marketing	0 - 2 years	engineering
10	10	6	10	10	9	10	4	10	8	18 - 30	Female	official	parlament	0 - 2 years	engineering
8	9	7	10	7	3	8	8	9	10	18 - 30	Female	director	own company	2 - 5 years	engineering
8	9	1	5	7	7	9	5	9	10	18 - 30	Female	foreman	projects dept	10 - 20 years	engineering
10	6	3	5	8	5	8	4	6	10	18 - 30	Female	secretary	construction project	0 - 2 years	engineering
9	9	9	10	9	7	8	9	10	10	31 - 40	Female	hvac designer	design dept	5 - 10 years	engineering
10	8	8	9	9	9	10	10	10	10	18 - 30	Female	construction worker	Ddd	0 - 2 years	engineering
10	10	10	9	8	10	10	10	10	10	41 - 50	Female	foreman assistant	implementation dept	2 - 5 years	engineering
10	10	10	10	7	10	10	10	10	10	31 - 40	Male	construction worker	BB büve	5 - 10 years	engineering
6	9	7	9	3	2	9	9	7	5	18 - 30	Female	foreman	concrete works	2 - 5 years	engineering
10	10	2	10	5	4	9	6	10	8	18 - 30	Female	WEP engineer	technical department	0 - 2 years	engineering
8	8	6	8	10	10	8	4	9	10	31 - 40	Female	unemployed	unemployed	10 - 20 years	engineering
10	7	5	10	8	7	9	7	9	9	31 - 40	Female	unemployed	unemployed	5 - 10 years	engineering
9	8	7	9	8	5	10	9	8	8	31 - 40	Male	WEP engineer	technical department	5 - 10 years	engineering
9	9	7	9	5	8	9	3	9	9	31 - 40	Male	foreman	construction dept	10 - 20 years	engineering
8	9	6	6	5	5	9	6	8	8	18 - 30	Female	foreman	construction firm	2 - 5 years	engineering
10	9	7	8	4	9	10	6	10	9	31 - 40	Female	do not know	do not know	0 - 2 years	engineering
10	10	5	10	5	7	8	7	8	10	18 - 30	Male	Architect assistant	architectural firm	0 - 2 years	engineering
8	9	6	9	7	4	8	7	8	7	31 - 40	Female	project manager	projects dept	5 - 10 years	engineering
9	6	7	10	8	10	9	10	8	10	18 - 30	Female	architect	self employed	0 - 2 years	engineering
10	10	7	10	8	10	9	9	10	10	18 - 30	Female	lecturer	school	0 - 2 years	engineering
10	10	4	10	10	5	7	3	8	10	41 - 50	Female	architect	architectural firm	20 - 30 years	engineering
7	9	6	8	6	7	10	9	8	9	31 - 40	Male	constructin worker	construction	10 - 20 years	engineering
7	9	7	9	9	10	8	9	9	10	18 - 30	Male	project manager	construction	5 - 10 years	engineering
5	6	5	10	10	3	7	7	10	8	18 - 30	Male	technical director	construction	5 - 10 years	engineering
8	7	7	10	10	6	9	4	10	8	41 - 50	Male	CEO	administration	30 - 40 years	engineering
6	6	7	5	7	5	7	5	6	7	31 - 40	Female	foreman	road dept	10 - 20 years	engineering
6	5	9	10	10	10	10	10	10	10	31 - 40	Male	head of costs estimation	costs estimation dept	10 - 20 years	engineering
9	9	4	9	10	10	10	3	10	10	41 - 50	Female	foreman	warranty works	10 - 20 years	engineering
7	8	3	8	8	10	9	3	9	10	41 - 50	Female	.	.	5 - 10 years	engineering
9	9	7	7	4	8	10	8	8	6	18 - 30	Male	foreman	civil construction dept	2 - 5 years	engineering
9	10	6	9	8	7	9	7	9	8	18 - 30	Male	employee	road construction	2 - 5 years	engineering
9	8	7	10	8	7	10	6	9	10	41 - 50	Female	board member	board	10 - 20 years	engineering
5	3	5	5	7	5	7	7	6	5	51 - 60	Female	costs estimator	costs estimation dept	20 - 30 years	engineering
8	9	6	8	10	8	9	8	10	10	41 - 50	Male	senior referent	construction policy	5 - 10 years	engineering
8	8	10	6	10	9	9	10	9	9	18 - 30	Female	technical director	technical department	5 - 10 years	engineering
7	7	7	7	8	5	6	5	9	6	18 - 30	Female	project coordinator	technical department	2 - 5 years	engineering
9	8	5	8	9	9	9	7	7	6	18 - 30	Female	Creative director	private company	0 - 2 years	engineering
5	5	5	5	5	5	5	5	5	6	41 - 50	Male	foreman	construction firm	10 - 20 years	engineering
9	9	8	10	8	8	10	9	10	9	31 - 40	Male	foreman	construction site	10 - 20 years	engineering
8	9	3	10	10	7	8	6	9	8	18 - 30	Male	foreman	construction	5 - 10 years	engineering
10	10	5	10	9	5	9	4	8	10	18 - 30	Male	costs estimator	costs estimation dept	2 - 5 years	engineering
10	10	5	8	9	9	8	7	8	8	51 - 60	Male	project manager	road dept	20 - 30 years	engineering
10	9	5	9	9	3	10	8	10	10	18 - 30	Female	financial controller	financial dept	0 - 2 years	engineering

8	10	7	10	8	3	6	10	8	10	18 - 30	Male	construction engineer	technical department	5 - 10 years	engineering
8	8	9	10	9	9	9	9	10	10	41 - 50	Female	foreman	civil construction dept	10 - 20 years	engineering
4	4	3	10	10	5	8	10	10	7	41 - 50	Male	controlling engineer	VZD	10 - 20 years	engineering
8	8	7	7	8	8	7	7	8	7	41 - 50	Male	foreman	Objekts	10 - 20 years	engineering
9	9	8	10	10	9	9	10	10	9	41 - 50	Male	foreman assistant	administration	10 - 20 years	engineering
9	9	6	9	7	5	7	5	7	7	51 - 60	Female	foreman	none	30 - 40 years	engineering
9	10	8	10	10	10	8	10	9	10	31 - 40	Female	foreman	project	10 - 20 years	engineering
10	8	3	10	8	8	9	5	6	7	41 - 50	Female	foreman	implementation dept	5 - 10 years	engineering
10	10	1	3	10	10	10	10	10	10	31 - 40	Female	CEO	Management	5 - 10 years	engineering
10	9	8	10	10	7	8	9	9	10	31 - 40	Female	foreman	Ceļu būvniecība	5 - 10 years	engineering
8	9	6	9	9	6	9	9	9	9	41 - 50	Female	foreman assistant	civil construction dept	10 - 20 years	engineering
10	10	9	9	7	8	10	5	8	9	18 - 30	Male	foreman	construction project	5 - 10 years	engineering
9	9	9	8	10	10	9	8	8	7	41 - 50	Female	technical secretary	projects dept	20 - 30 years	engineering
10	10	8	10	10	10	9	9	10	9	31 - 40	Male	foreman	construction dept	10 - 20 years	engineering
7	8	4	9	8	5	7	7	10	7	41 - 50	Female	Projektu vadītāja	projects dept	10 - 20 years	engineering
10	10	1	10	10	1	10	7	10	7	41 - 50	Male	manager	procurement	10 - 20 years	engineering
2	2	3	5	8	3	4	6	5	4	51 - 60	Male	structural engineer	design dept	20 - 30 years	engineering
10	9	10	10	9	10	10	8	10	10	18 - 30	Male	foreman	construction project	0 - 2 years	engineering
8	8	7	9	6	7	9	9	5	6	41 - 50	Female	architect	design	10 - 20 years	engineering
10	8	8	9	10	10	9	10	10	9	31 - 40	Male	architect	Architect	10 - 20 years	engineering
10	8	5	9	6	1	7	6	9	8	18 - 30	Male	foreman	Sia BCC	5 - 10 years	engineering
8	6	7	8	5	2	7	7	8	9	31 - 40	Female	foreman assistant	concrete works	10 - 20 years	engineering
9	9	2	10	10	8	10	6	9	8	51 - 60	Male	foreman	construction	20 - 30 years	engineering
7	8	9	10	10	10	10	8	10	10	18 - 30	Male	foreman	projects dept	2 - 5 years	engineering
9	9	6	8	7	7	7	7	8	7	31 - 40	Female	architect	Architect	10 - 20 years	engineering
8	8	9	8	8	7	9	8	8	8	18 - 30	Female	project manger assistant	implementation dept	2 - 5 years	engineering
8	6	9	10	10	8	10	9	10	10	18 - 30	Female	project manger assistant	implementation dept	0 - 2 years	engineering
9	9	5	9	9	4	7	8	9	9	51 - 60	Female	architect	private company	5 - 10 years	engineering
10	10	8	10	10	4	10	10	8	10	51 - 60	Female	CEO	unemployed	20 - 30 years	engineering
10	9	6	10	6	8	10	9	10	10	31 - 40	Female	Construction inspector's	Riga construction board	2 - 5 years	engineering
3	8	7	9	9	8	8	9	7	10	41 - 50	Male	COO	Business development	10 - 20 years	engineering
5	6	7	6	8	5	7	9	8	7	41 - 50	Male	inženieris	glass structure	10 - 20 years	engineering
9	9	8	10	10	10	10	10	10	10	41 - 50	Male	architect	architectural firm	10 - 20 years	engineering
10	10	8	9	10	8	10	10	8	10	31 - 40	Male	foreman	networks	5 - 10 years	engineering
8	8	5	9	9	9	9	6	7	7	18 - 30	Female	architect	private company	0 - 2 years	engineering
9	8	8	10	8	7	9	8	10	7	18 - 30	Female	Senior referent	Construction and residential design department	10 - 20 years	engineering
9	9	9	8	8	10	10	10	9	9	41 - 50	Female	System analytic	IT	0 - 2 years	engineering
10	8	8	10	8	8	8	9	10	10	31 - 40	Male	Programmer	IT	0 - 2 years	engineering
8	7	10	7	8	10	8	9	8	10	41 - 50	Male	IT speciālist	IT	10 - 20 years	engineering
10	10	3	10	5	10	10	5	10	10	18 - 30	Male	project manager	product development	5 - 10 years	engineering
10	9	8	10	8	9	7	8	10	10	51 - 60	Male	construction engineer	retired	20 - 30 years	engineering
10	10	6	10	10	10	10	7	10	10	31 - 40	Female	Management block	Management block	5 - 10 years	engineering
10	8	7	10	10	10	8	9	10	10	41 - 50	Female	official	municipality	0 - 2 years	not engineering
9	10	9	9	7	9	10	10	9	9	18 - 30	Female	Senior lawyer	legal firm	2 - 5 years	law science
9	8	8	8	10	10	8	10	10	7	31 - 40	Male	managing	legal	10 - 20 years	law science
9	10	7	10	7	10	10	8	7	7	18 - 30	Female	lawyer	legal dept	0 - 2 years	law science
6	8	10	10	5	9	9	10	9	7	31 - 40	Female	Lietvedis	Izglītības pārvalde	0 - 2 years	law science
10	5	8	8	8	3	7	9	8	8	31 - 40	Female	official		0 - 2 years	law science
8	2	9	10	3	5	1	8	3	4	51 - 60	Male	Marketing	marketing	5 - 10 years	law science
9	7	7	8	8	7	6	8	9	10	31 - 40	Female	lawyer	legal dept	5 - 10 years	law science
9	9	9	8	6	7	9	7	10	8	18 - 30	Female	lawyer	legal	2 - 5 years	law science
6	6	4	9	8	9	10	8	9	6	31 - 40	Male	lawyer	legal	5 - 10 years	law science
7	8	5	8	7	8	9	8	9	9	41 - 50	Female	board member	board	0 - 2 years	law science
7	8	9	8	9	8	8	9	8	9	31 - 40	Male	sales specialist	sales	0 - 2 years	law science
9	10	3	10	10	9	10	10	10	10	31 - 40	Male	lawyer	legal	2 - 5 years	law science
8	8	7	9	8	6	8	8	8	9	31 - 40	Female	Marketing	administration	0 - 2 years	law science
7	8	7	9	7	7	7	7	6	6	31 - 40	Male	HR	HR	5 - 10 years	law science
10	10	8	10	7	7	10	9	8	7	18 - 30	Male	lawyer	legal dept	0 - 2 years	law science
9	9	6	10	10	10	8	8	6	8	41 - 50	Male	coordinator	projects dept	5 - 10 years	communication science
9	8	5	8	7	7	8	7	9	9	18 - 30	Female	Marketing	communication	0 - 2 years	communication science
10	8	8	10	6	7	9	10	10	10	31 - 40	Male	mid level manager		2 - 5 years	engineering
10	10	2	10	8	5	9	3	10	8	18 - 30	Male	PR	administration	2 - 5 years	communication science
10	10	6	10	8	1	10	10	10	10	31 - 40	Female	business development m	business development	2 - 5 years	engineering
10	10	9	10	10	7	10	9	10	10	41 - 50	Female	project coordinator	sales	20 - 30 years	social science
10	10	9	10	10	7	10	9	10	10	41 - 50	Female	self employed	administration	20 - 30 years	engineering
10	9	8	10	8	8	9	8	9	8	18 - 30	Female	consultant	consultant	2 - 5 years	engineering
10	10	9	8	9	9	8	9	9	8	31 - 40	Female	networks project manage	projects dept	10 - 20 years	engineering
9	8	4	10	10	9	7	6	8	8	31 - 40	Female	journalist		2 - 5 years	social science

9	9	6	9	10	9	8	7	9	5	18 - 30	Male	assistant	construction site	0 - 2 years	engineering
8	8	9	9	8	9	9	9	9	9	41 - 50	Female	birth leave	at home	10 - 20 years	engineering
9	8	7	10	7	10	9	8	10	10	18 - 30	Female	digital media	marketing	2 - 5 years	social science
9	8	7	8	7	6	7	8	9	7	31 - 40	Female	Marketing	3D modeling	0 - 2 years	engineering
9	8	8	8	9	10	8	9	10	8	31 - 40	Female	marketing project mana	marketing	2 - 5 years	social science
10	9	8	10	9	10	10	9	10	10	41 - 50	Female	office manager	administration	5 - 10 years	social science
8	8	6	10	10	10	9	9	9	10	31 - 40	Female	birth leave	design	0 - 2 years	engineering
10	10	6	10	10	10	10	7	10	10	18 - 30	Male	coordinator	private company	0 - 2 years	engineering
10	10	10	10	9	9	10	10	9	10	31 - 40	Male	consultant	ES fonds	2 - 5 years	engineering
10	9	10	10	8	10	10	8	9	10	31 - 40	Male	designer	design dept	2 - 5 years	engineering
8	8	8	10	10	5	10	10	9	6	18 - 30	Male	self employed	self employed	2 - 5 years	engineering
9	10	5	9	7	8	10	6	7	9	41 - 50	Male	project manager	projects dept	2 - 5 years	engineering
5	7	6	7	6	6	7	6	5	6	51 - 60	Male	driver	logistics	2 - 5 years	secondary school
10	10	10	10	10	8	10	10	10	10	31 - 40	Male	secretary		2 - 5 years	engineering
9	5	7	10	10	7	10	8	8	10	31 - 40	Female	coordinator	finanšu nodaļā	2 - 5 years	LU
10	9	10	10	5	10	10	10	10	10	51 - 60	Female	unemployed	unemployed	10 - 20 years	agriculture
9	9	7	9	10	9	10	8	10	10	41 - 50	Female	office employee	procuement	5 - 10 years	administration
8	9	7	9	8	8	8	7	9	7	31 - 40	Female	administrator		0 - 2 years	social science
9	10	8	10	10	8	10	10	10	10	18 - 30	Male	designer	design	0 - 2 years	art
10	9	5	10	6	7	10	8	10	5	18 - 30	Female	cost estomator	costs estimation dept	2 - 5 years	engineering
9	10	8	8	9	9	8	9	7	7	41 - 50	Female	secretary	project	5 - 10 years	social science
9	8	6	8	6	6	9	10	7	8	18 - 30	Female	unemployed	unemployed	0 - 2 years	social science
9	9	3	7	8	9	8	8	7	6	31 - 40	Male	designer	private company	0 - 2 years	art
9	8	5	10	10	7	9	7	10	10	31 - 40	Male	self employed	self employed	0 - 2 years	art
9	8	6	9	9	7	9	4	7	6	31 - 40	Male	project manager	projects dept	2 - 5 years	engineering
10	9	10	10	10	10	9	10	10	9	41 - 50	Male	designer	design dept	5 - 10 years	engineering
8	9	7	7	8	5	10	6	10	10	18 - 30	Male	designer	private company	0 - 2 years	engineering
9	9	7	10	10	9	9	8	10	7	51 - 60	Male	coordinator	administration	2 - 5 years	engineering
10	9	10	10	8	2	9	10	10	10	18 - 30	Male	manager	projects dept	0 - 2 years	engineering
10	10	9	9	9	10	9	10	9	9	18 - 30	Male	project coordinator	technical department	2 - 5 years	engineering
8	8	8	8	9	7	7	9	9	7	18 - 30	Male	IT specialists	IT	0 - 2 years	engineering
9	9	8	10	9	10	10	8	10	10	18 - 30	Male	assistant	project	0 - 2 years	engineering
9	10	6	10	10	7	9	6	9	6	18 - 30	Male	Quality assurance manag	technical department	5 - 10 years	engineering
9	8	7	7	8	8	8	9	10	10	18 - 30	Male	Marketing specialist	marketing	0 - 2 years	social science
8	9	6	10	9	8	9	8	8	6	31 - 40	Male	project manager	projects dept	10 - 20 years	engineering
9	9	10	10	8	8	9	10	10	10	41 - 50	Male	landscaping foreman	self employed	5 - 10 years	engineering
10	9	7	10	10	6	10	8	10	10	18 - 30	Male	manager	business development	0 - 2 years	business administration
10	8	9	10	8	10	8	6	9	10	31 - 40	Male	manager	administration	2 - 5 years	medical
10	10	4	9	9	10	10	5	9	10	18 - 30	Male	board member	private company	2 - 5 years	engineering
10	10	3	10	8	6	8	5	10	10	31 - 40	Male	project coordinator	Slimnīca	2- 5 years	engineering
10	9	8	10	9	10	8	9	9	8	18 - 30	Female	foreman	project	0 - 2 years	engineering
10	8	7	10	8	8	9	8	10	10	31 - 40	Female	foreman	site	10 - 20 years	engineering
8	9	7	9	8	7	10	8	10	10	18 - 30	Male	project manager	real estate	2 - 5 years	engineering
8	7	8	10	8	8	8	8	10	9	18 - 30	Male	CEO	private company	2 - 5 years	social science
9	9	8	9	8	10	10	8	10	7	61 and more	Male	official	governmental institution	10 - 20 years	medical
8	9	4	5	8	6	5	5	6	10	31-40	Male	coordinator	administration	0 - 2 years	social science
10	10	7	7	9	9	9	9	9	9	31-40	Male	secretary	construction site	0 - 2 years	engineering
10	10	10	10	10	10	10	10	10	10	18-30	Male	project manager	projects dept	2 - 5 years	engineering
10	10	10	10	10	10	10	10	10	10	61 and more	Male	equipment operator	logistics	20- 30 years	engineering
10	10	10	10	10	10	10	10	10	10	31 - 40	Male	worker	Celtniecība	2 - 5 years	secondary school
10	9	6	9	5	8	7	5	9	8	41 - 50	Male	project manager	none	10 - 20 years	engineering
5	10	10	10	10	10	6	5	10	10	18 - 30	Male	designer	self employed	0 - 2 years	engineering
8	8	7	10	8	7	9	8	9	9	18 - 30	Male	administrator	administration	0 - 2 years	finance
9	9	7	9	7	7	9	9	10	10	18 - 30	Male	insurance specialist	financial dept	2 - 5 years	finance
9	7	7	7	9	5	9	8	8	8	18 - 30	Male	director	private company	5 - 10 years	engineering
8	8	8	10	6	4	7	9	8	8	18 - 30	Female	maintenance	private company	0 - 2 years	social science
8	6	3	9	9	3	8	6	8	8	18 - 30	Female	hr development specialis	business development	2 - 5 years	social science
9	9	6	8	8	5	7	5	9	10	18 - 30	Female	3D modeling	bim	0 - 2 years	engineering
9	9	5	10	8	8	10	9	10	10	18 - 30	Male	technical manager	employee	2 - 5 years	secondary school
8	8	8	8	9	5	9	8	9	8	31 - 40	Male	lecturer	Rtu	5- 10 years	engineering
9	8	7	6	8	8	8	7	7	8	18 - 30	Male	Student	RTU	0 - 2 years	secondary school
8	7	5	7	6	8	6	8	6	10	18 - 30	Male	foreman assistant	unemployed	2 - 5 years	secondary school
10	10	8	10	9	7	10	10	9	9	18 - 30	Female	project manger assistant	projects dept	0 - 2 years	engineering
10	9	8	10	8	6	9	7	8	8	18 - 30	Female	secretary	project	0 - 2 years	secondary school
8	7	5	8	6	4	8	5	10	10	18 - 30	Male	worker	site	2 - 5 years	secondary school
9	9	5	10	7	10	9	10	10	9	18 - 30	Male	foreman assistant	road construction	0 - 2 years	engineering
9	9	8	10	10	10	9	10	10	8	18 - 30	Male	worker	As acb	2 - 5 years	secondary school
10	10	9	10	10	10	10	10	10	10	51 - 60	Male	worker	As acb	5 - 10 years	secondary school
10	10	2	8	8	7	9	4	9	10	18 - 30	Male	employee	Acb	0 - 2 years	engineering
8	7	6	9	7	10	8	7	9	8	18 - 30	Male	foreman	construction site	5 - 10 years	engineering

9	8	8	8	5	9	9	9	8	9	31 - 40	Male	assistant	construction site	0 - 2 years	engineering
10	5	8	10	10	2	10	9	8	9	31 - 40	Male	project coordinator	technical department	5 - 10 years	engineering
6	6	7	8	8	10	7	6	7	7	31 - 40	Male	designer	self employed	0 - 2 years	engineering
8	8	7	9	9	8	8	7	8	8	41 - 50	Male	worker	As acb	10 - 20 years	secondary school
5	5	5	5	8	5	5	5	5	5	31 - 40	Male	foreman	As acb	2 - 5 years	engineering
5	5	5	5	5	5	5	5	5	5	31 - 40	Male	foreman	As acb	2 - 5 years	engineering
8	9	9	10	10	7	8	9	10	8	31 - 40	Male	project coordinator	civil construction dept	5 - 10 years	engineering
8	9	7	10	9	8	9	8	9	8	31 - 40	Male	director	department	5 - 10 years	engineering
8	8	9	8	7	9	9	9	10	10	41 - 50	Female	construction data site op	private company	5 - 10 years	engineering
10	10	7	10	5	8	10	8	9	10	51 - 60	Male	foreman	self employed	10 - 20 years	engineering
9	9	7	9	10	8	9	9	8	8	31 - 40	Male	foreman assistant	private company	2 - 5 years	engineering
10	10	7	10	9	9	10	8	10	10	31 - 40	Male	technial secretary	private company	2 - 5 years	law science
9	7	5	8	10	9	8	7	6	10	18 - 30	Male	foreman	private company	0 - 2 years	engineering
9	9	5	10	8	4	7	7	9	9	18 - 30	Male	foreman	construction site	0 - 2 years	engineering
10	9	9	9	7	9	9	8	9	8	31 - 40	Male	project coordinator	technical department	10 - 20 years	engineering
10	9	10	6	6	7	8	8	9	10	18 - 30	Male	quality assurance manage	administration	0 - 2 years	engineering
10	10	8	10	7	8	9	7	9	10	31 - 40	Male	project manger assistant	construction site	5 - 10 years	engineering
8	5	4	8	8	9	8	7	6	8	31 - 40	Female	administrative director	real estate	5 - 10 years	law science
8	8	8	10	10	10	10	10	10	10	31 - 40	Female	administrator	ministry	0 - 2 years	social science
5	5	5	5	5	5	5	5	5	5	31 - 40	Male	secretary	construction site	2 - 5 years	social science
10	10	7	10	10	10	10	10	10	10	41 - 50	Male	administrator	Dokumentation dept	5 - 10 years	social science
8	5	5	10	10	10	10	7	10	10	41 - 50	Male	technial secretary	civil construction dept	2 - 5 years	engineering
7	8	8	10	10	5	10	9	10	7	18 - 30	Female	referent	governmental institution	2 - 5 years	philosophy
5	8	8	10	9	10	10	10	10	10	18 - 30	Female	coordinator	mechanization	0 - 2 years	engineering
10	8	7	10	8	9	9	10	9	10	18 - 30	Female	manager assistant	administration	0 - 2 years	social science
8	8	9	7	9	7	9	6	7	9	41 - 50	Male	self employed	self employed	10 - 20 years	engineering
9	8	6	5	8	4	8	6	8	7	18 - 30	Male	editor	editor	5 - 10 years	social science
10	10	10	10	5	1	10	10	10	10	41 - 50	Female	senior engineer	administration	2 - 5 years	engineering
10	7	7	10	8	7	7	9	9	9	31 - 40	Female	designer	unemployed	2 - 5 years	engineering
10	8	7	9	8	8	7	9	10	7	18 - 30	Female	quality assurance employe	technical department	0 - 2 years	engineering
10	8	5	10	9	4	10	6	10	10	31 - 40	Male	PR specialist	PR	2 - 5 years	social science
10	9	5	10	7	6	7	7	8	10	18 - 30	Male	Gas suply engineer	project approval dept	2 - 5 years	engineering
9	9	6	10	8	8	10	9	9	9	41 - 50	Male	Auditor	quality and safety	10 - 20 years	engineering
7	7	2	10	9	2	10	5	10	8	31 - 40	Male	social media and advertis	marketing	5 - 10 years	social science
10	10	1	10	10	1	10	1	10	10	41 - 50	Male	Märketinga specialiste	marketing	2 - 5 years	social science
10	8	8	10	8	7	10	9	6	10	41 - 50	Male	designer	design	10 - 20 years	engineering
9	10	9	10	10	10	10	10	9	10	41 - 50	Male	technial secretary	construction site	10 - 20 years	engineering
10	8	7	8	7	9	10	8	8	6	18 - 30	Male	foreman assistant	site	0 - 2 years	engineering
10	9	9	9	9	9	9	9	9	9	31 - 40	Male	foreman	self employed	5 - 10 years	engineering
10	7	8	10	9	10	10	9	10	10	18 - 30	Male	project manger assistant	construction site	0 - 2 years	engineering
10	10	8	10	8	10	9	8	9	8	41 - 50	Male	senior engineer	governmental institution	10 - 20 years	engineering
9	8	7	8	7	9	8	9	9	9	18 - 30	Male	assistant	nav	0 - 2 years	engineering
9	10	8	10	9	3	9	9	10	10	31 - 40	Female	health and safety	quality and safety dept	10 - 20 years	engineering
9	10	7	9	9	9	9	7	9	7	41 - 50	Female	finansists	Finanšu	5 - 10 years	finance
10	9	8	9	9	9	9	8	9	9	51 - 60	Male	owner	landscaping	10 - 20 years	engineering
10	9	7	10	9	9	8	8	8	9	18 - 30	Female	assistant	projects dept	2 - 5 years	social science
9	8	6	9	8	7	10	7	10	8	41 - 50	Female	procurement manager	procuement	10 - 20 years	law science
10	8	6	10	7	6	10	10	8	10	41 - 50	Female	technial secretary	construction site	20 - 30 years	engineering
10	6	4	10	8	2	10	5	10	7	41 - 50	Male	manager	hr department	20 - 30 years	social science
10	6	4	10	8	2	10	5	10	7	41 - 50	Male	project manager	export department	20 - 30 years	engineering
8	8	5	7	5	8	7	6	6	7	31 - 40	Male	foreman	marine construction	5 - 10 years	engineering
10	10	4	10	8	5	10	8	10	10	18 - 30	Male	project manger assistant	private company	0 - 2 years	engineering
10	10	4	10	8	5	10	8	10	10	18 - 30	Male	Personāla vadītāja	Personāldaļa	5 - 10 years	social science
9	8	7	9	7	5	8	10	5	7	18 - 30	Male	health and safety	administration	0 - 2 years	engineering
10	7	8	8	10	9	8	9	9	8	31 - 40	Male	foreman	site	10 - 20 years	engineering
9	8	3	10	9	7	7	7	7	7	31 - 40	Male	foreman	construction site	5 - 10 years	engineering
10	10	6	10	8	7	10	7	10	10	18 - 30	Male	project manager	projects dept	2 - 5 years	engineering
10	10	6	10	8	5	8	7	10	10	18 - 30	Male	lawyer	legal firm	2 - 5 years	law science
7	10	5	10	9	8	9	9	10	9	41 - 50	Female	office manager	administration	2 - 5 years	social science
9	8	5	10	9	9	8	9	10	9	41 - 50	Female	bookkeeping	bookkeeping	10 - 02 years	finance
9	8	7	8	9	6	8	8	9	10	18 - 30	Female	marketing specialist	marketing	0 - 2 years	social science
7	8	8	8	7	5	7	8	9	8	31 - 40	Female	lawyer	legal dept	2 - 5 years	law science
8	8	8	6	8	9	8	8	9	8	41 - 50	Male	Juriste	governmental institution	2 - 5 years	law science
9	9	6	9	9	8	9	9	9	9	31 - 40	Female	lawyer	legal dept	5 - 10 years	law science
7	7	10	7	3	4	9	7	10	10	18 - 30	Male	lawyer	legal firm	2 - 5 years	law science
10	10	10	9	10	9	9	9	9	9	18 - 30	Male	equipment operator	base	2 - 5 years	engineering
10	10	6	10	7	10	5	7	10	10	41 - 50	Male	foreman	site	10 - 20 years	engineering
10	8	8	9	6	8	8	8	10	10	18 - 30	Male	lawyer	administration	2 - 5 years	law science
7	5	7	10	10	10	10	8	10	10	18 - 30	Female	technial secretary	construction site	0 - 2 years	social science

10	9	5	10	7	4	8	9	9	9	18 - 30	Male	dispatcher	transport	2 - 5 years	engineering
7	10	2	10	10	3	8	3	10	10	31 - 40	Male	foreman	construction site	5 - 10 years	engineering
8	9	8	9	9	10	9	9	9	9	31 - 40	Male	foreman	construction site	5 - 10 years	engineering
10	8	8	8	9	10	8	9	8	10	31 - 40	Male	project coordinator	private company	10 - 20 years	engineering
8	9	10	8	8	8	9	8	8	9	61 and more	Male	senior project manager	unemployed	20 - 30 years	engineering
8	9	3	10	8	8	8	8	8	8	41 - 50	Male	foreman	building	5 - 10 years	engineering
7	6	8	10	8	10	7	9	9	8	18 - 30	Male	real estate developer	private company	2 - 5 years	engineering
9	9	9	9	10	2	6	8	8	10	41 - 50	Male	board member	administration	10 - 20 years	engineering
8	9	6	9	8	6	5	7	8	8	31 - 40	Male	board member	board	10 - 20 years	engineering
10	9	10	8	9	9	9	8	9	9	18 - 30	Male	foreman	civil construction dept	2 - 5 years	engineering
10	9	10	8	9	9	9	8	9	9	18 - 30	Male	project manager	road construction	2 - 5 years	engineering
8	8	9	9	9	9	7	8	10	10	41 - 50	Female	project manager	construction site	10 - 20 years	engineering
9	9	5	9	7	7	9	8	9	9	18 - 30	Male	project manager	implementation dept	2 - 5 years	engineering
10	9	7	10	7	10	10	10	10	10	31 - 40	Female	project coordinator	self employed	10 - 20 years	engineering
8	10	5	10	10	7	10	7	10	8	31 - 40	Male	project manager	export department	5 - 10 years	engineering
8	10	5	10	10	7	10	7	10	8	31 - 40	Male	project coordinator	private company	5 - 10 years	engineering
10	10	4	10	10	6	10	10	10	10	31 - 40	Male	procurement manager	procurement	10 - 20 years	engineering
10	9	8	10	10	10	10	10	8	8	31 - 40	Male	project manger assistant	Märketings	10 - 20 years	engineering
8	8	7	8	8	6	9	9	10	10	31 - 40	Male	manager	administration	5 - 10 years	engineering
10	10	6	7	8	10	10	9	9	10	61 and more	Male	senior project manager	construction site	30 - 40 years	engineering
8	8	7	8	7	8	7	7	8	6	18 - 30	Female	office manager	office	0 - 2 years	business administration
8	7	5	8	9	9	9	9	8	8	31 - 40	Male	procurement manager	tender department	5 - 10 years	engineering
9	8	4	7	5	8	8	8	9	7	31 - 40	Male	foreman	civil construction dept	10 - 20 years	engineering
9	10	8	10	10	10	10	9	10	10	31 - 40	Female	technial secretary	technical department	10 - 20 years	social science
9	10	8	10	10	10	10	9	10	10	31 - 40	Male	foreman	site	10 - 20 years	engineering
10	10	10	10	10	10	10	10	10	10	41 - 50	Female	financial controller	self employed	10 - 20 years	engineering
10	10	8	9	9	4	9	8	10	10	31 - 40	Male	board member	board	5 - 10 years	engineering
9	7	4	10	8	8	8	7	8	10	31 - 40	Male	project manager	implementation dept	10 - 20 years	engineering
10	10	8	10	10	9	10	10	10	10	18 - 30	Male	business development m	administration	0 - 2 years	social science
10	9	9	8	10	8	10	9	9	10	61 and more	Male	technical director	technical department	20 - 30 years	engineering
8	8	6	10	10	10	10	6	9	9	41 - 50	Male	project manager	construction site	10 - 20 years	engineering
10	10	3	10	10	9	10	10	10	9	31 - 40	Male	quality assurance manag	unemployed	10 - 20 years	engineering
10	9	8	10	8	4	9	9	9	10	18 - 30	Male	hr manager	hr department	0 - 2 years	social science
8	10	7	8	7	9	9	9	10	10	18 - 30	Male	procurement manager	administration	0 - 2 years	social science
8	7	9	10	9	8	9	7	7	7	18 - 30	Male	draftsman	technical department	5 - 10 years	engineering
10	7	5	10	7	9	9	7	10	9	31 - 40	Female	designer	design dept	5 - 10 years	engineering
8	8	3	10	8	7	8	5	8	9	31 - 40	Female	senior geologica engineer	geological dept	10 - 20 years	engineering
5	9	7	9	9	9	9	8	9	9	31 - 40	Male	foreman	site	5 - 10 years	engineering
7	9	8	9	5	10	10	10	9	10	51 - 60	Male	project manager	projects dept	20 - 30 years	engineering
8	8	8	10	10	8	10	10	9	8	31 - 40	Male	foreman	construction site	10 - 20 years	engineering
10	10	8	10	7	10	9	9	10	9	31 - 40	Male	construction engineer	technical department	10 - 20 years	engineering
7	8	7	9	9	5	9	9	9	10	31 - 40	Female	technial secretary	warranty projects	5 - 10 years	engineering
10	10	7	8	10	10	10	10	8	10	41 - 50	Male	project manager	technical department	20 - 30 years	engineering

Definitions of the “construction” and “construction industry”:

1. **Construction** - The action of building something, typically a large structure. (<https://en.oxforddictionaries.com/definition/construction>)
2. **General construction** and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature. General construction is the construction of entire dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. This work can be carried out on own account or on a fee or contract basis. Portions of the work and sometimes even the whole practical work can be subcontracted out. (*NACE Rev. 2 – Statistical classification of economic activities in the European Community. Page 212, Luxembourg: Office for Official Publications of the European Communities, 2008*)
3. **Construction works** means buildings and civil engineering works (*REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, Official Journal of the European Union, 4.4.2011, L88/10. Page 10*)
4. **The construction** includes a wide range of economic activities, going from the extraction of raw materials, the manufacturing and distribution of construction products up to the design, construction, management and control of construction works, their maintenance, renovation and demolition, as well as the recycling of construction and demolition waste. (*The European construction sector – a global partner. Brochure, March, 2016, <http://ec.europa.eu/growth/sectors/construction/>*)
5. **Building construction** is the process of assembling materials to form a building. Building construction is generally performed by laborers and craftspeople engaged for the purpose by an individual or organization, called a contractor. Merritt & Ricketts 2000 (*Building design and construction handbook / Frederick S. Merritt, Jonathan T. Ricketts, 6th ed., section 1, art. 1.1, McGRAW-HILL, 2000*)
6. **"construction (work)** - part of the construction process, work carried out at a construction site or in a structure to create a structure, to place a pre-manufactured structure or part thereof, to rebuild, renew, restore, preserve, demolish a structure or install an engineering network;" (*Latvian CONSTRUCTION LAW <https://likumi.lv/ta/en/en/id/258572-construction-law>*)
7. **Construction** is an economic activity directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature, and other such engineering constructions as roads, bridges, dams and so forth. OECD Glossary of statistical Terms (<https://stats.oecd.org/glossary/detail.asp?ID=422>)
8. Construction work means the carrying out of any building, civil engineering or engineering construction work and includes:
 - a) the construction, alteration, conversion, fitting out, commissioning, renovation, repair, upkeep, redecoration or other maintenance (including cleaning which involves the use of

Definitions of the “construction” and “construction industry”

- water or an abrasive at high pressure, or the use of corrosive or toxic substances), de-commissioning, demolition or dismantling of a structure;
- b) the preparation for an intended structure, including site clearance, exploration, investigation (but not site survey) and excavation (but not pre-construction archaeological investigations), and the clearance or preparation of the site or structure for use or occupation at its conclusion;
 - c) the assembly on site of prefabricated elements to form a structure or the disassembly on site of the prefabricated elements which, immediately before such disassembly, formed a structure;
 - d) the removal of a structure, or of any product or waste resulting from demolition or dismantling of a structure, or from disassembly of prefabricated elements which immediately before such disassembly formed such a structure;
 - e) the installation, commissioning, maintenance, repair or removal of mechanical, electrical, gas, compressed air, hydraulic, telecommunications, computer or similar services which are normally fixed within or to a structure, but does not include the exploration for, or extraction of, mineral resources, or preparatory activities carried out at a place where such exploration or extraction is carried out;

The Construction and Design Regulations, 2015, UK

<https://www.legislation.gov.uk/ukxi/2015/51/regulation/2/made>

9. **Construction** comprises a wide variety of activities and products. Many agents are involved, ranging from those responsible for funding, planning, design, procurement and supervision to those carrying out the work. In the road sector - when works are contracted out - the principal agents include government agencies, banks and other credit agencies, suppliers of goods, services and materials, consultants and contractors. The latter group is widely diversified, ranging from multinational firms to micro contractors, sometimes limited to one person such as the road maintenance “length person” responsible for the routine maintenance of a stretch of road. In order to increase productive and quality employment in the construction sector in developing countries, imaginative and alternative approaches can be applied with different roles and responsibilities for all these actors. In particular the civil works sector - roads, irrigation, water supply, soil conservation - offers a huge potential for job creation through employment-oriented investment policies and strategies.
Bentall et al, 1999 (Peter Bentall, Andreas Beusch and Jan de Veen “Employment-Intensive Infrastructure Programs: Capacity Building for Contracting in the Construction Sector. Guidelines” 1999, International Labor Organization, Geneva, Switzerland, 244p)
10. **Construction**, as recorded in national accounts, includes housing construction, construction of business structure, and infrastructure related construction. Sun et al 2013 (Yan Sun, Pritha Mitra, and Alejandro Simone “The Driving Force behind the Boom and Bust in Construction in Europe”, 2013 International Monetary Fund)
11. **Construction** means different things to different people. It can mean building a house, a high-rise building, a dam, an industrial plant, an airport, or even remodelling or upgrading

Definitions of the “construction” and “construction industry”

a facility. Ritz (1994) (George J. Ritz “ Total Construction Project Management “1994 by McGraw-Hill, Inc. USA)

12. **Construction**... includes repair and renovation works in cities, houses, public utilities, retail spaces, offices and infrastructure need to adapt to cope with the increasing number of residents and visitors, urban functions and changing standards. Construction projects contribute to more attractive, sustainable and economically viable urban areas once they are finished. Janne et al 2018 (Mats Janne, Anna Fredriksson, Michael Berden, Walther Ploos van Amstel “Smart Construction Logistics” 2018, CIVIC project, 48 p)
13. **General construction** is the construction of entire dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. ISIC 2008(“International Standard Industrial Classification of All Economic Activities” rev 4. United Nations, 2008, 306 p)
14. **The construction** includes house building, commercial, and infrastructure. Mackey et al 2021 (Matthew Mackey, Simon Rawlinson, Agnieszka Krzyzaniak “Window of Opportunity. Australia construction winter market review” 2021 Arcadis, 12p)
15. **Construction** includes the following kinds of works: Residential and industrial Buildings, Commercial and Institutional Buildings, Water and Sewer Line and Related Structures, Oil and Gas Pipeline and Related Structures, Power and Communication Line and Related Structures, Land Subdivision, Highway, Street, and Bridges, Other Heavy and Civil Engineering Construction. Dong 2013(Xiuwen (Sue) Dong “The construction chart book The U.S., Construction Industry and Its Workers” 5th edition 2013, CPWR – The Center for Construction Research and Training. USA 146 p)
16. **Construction** is the process of preparing and forming buildings and building systems. Construction starts with planning, design, and financing and continues until the structure is ready for occupancy. Maksimovic 2014 (Ivana Maksimovic “Construction administration and construction management”, 2014, ICSC European Retail Property School, Berlin, Germany,74p)
17. **The construction industry** (including design, new and renovation construction, and the manufacture and supply of building materials and equipment) is one of the largest industries. Nunnally 2007(S.W. Nunnally “Construction methods and management /—7th ed”, 2007. Pearson Education, Inc USA)
18. **Construction industry**, unlike most others, is not a single industry but is made up of several different market areas. For purposes of classification it can be divided into four areas: Building, Civil engineering, Repair and maintenance, Materials manufacture. Langford & Male (2001) (David Langford & Steven Male “Strategic Management in Construction ” 250pages Blackwell Science Ltd, a Blackwell Publishing company, UK)
19. **The construction industry** has matured and continued to enhance the integration of activities in the design, fabrication, construction, and operation of constructed facilities. Oberlender 2000, (Oberlender, Garold D “Project management for engineering and construction. International Edition” 2000 The McGraw-Hill Companies, Inc. USA
20. **The construction industry** has narrow and broad definitions. The narrow definition confines attention to the on-site construction activity. The true extent of the industry is broader, and includes the quarrying of construction raw materials, the manufacture of

Definitions of the “construction” and “construction industry”

building materials, the sale of construction products, and the various associated professional services. Pearce 2003 (From The Construction Industry’s Contribution to Sustainable Development by Professor David Pearce OBE, published by nCRISP, the Construction Industry Research and Innovation Strategy Panel’ 2003.)

21. The broad **construction sector**... includes architecture, civil engineering and manufacturing of construction products among others, plays a strategic role in the EU economy. Naumanen 2019 (Mika Naumanen, “Priority sector report: Construction industry”, European Commission, 29p)
22. **The construction industry** is traditionally divided into three sub-sectors. They are: 1) the construction of buildings; 2) road, highway, and other “infrastructure” construction; and 3) specialty trades. It thus encompasses all the businesses that build either houses and office buildings or highways and bridges, as well as those who do the specialized work of electricians, plumbers and masons, who are typically involved in the construction of all kinds of structures. Szymanski 2007 (Sharon Szymanski “What is The construction industry? An economic fact book.” 2007The Harry Van Arsdale Jr center for labor studies. Empire State College/SUNNY)
23. **The construction industry**, and its broader ecosystem, erects buildings, infrastructure, an industrial structures that are the foundation of our economies and are essential to our daily lives. It has successfully delivered ever more challenging projects, from undersea tunnels to skyscrapers. Ribeirinho et al, 2020 (Maria João Ribeirinho, Jan Mischke, Gernot Strube, Erik Sjödin, Jose Luis Blanco, Rob Palter, Jonas Biörck, David Rockhill, and Timmy Andersson, “The Next Normal in Construction: How disruption is reshaping the world’s largest ecosystem.” June, 2020. McKinsey & Company, 90 p)
24. **The construction industry**, includes the following sub-industries: Site preparation/excavation, Heavy highway, utility contracting, non-residential and/or residential building, concrete, asphalt, mining, aggregates production, material transport, oil and gas, other. Heron, 2021 (Jim Heron, “2021 Construction Industry forecast” 2021, Wells Fargo Bank, USA 41p)
25. **The construction industry** has mainly focused on the building firm’s size, the structure of employment, and the division of building, civil engineering, and R & M construction works. Carassus 2004 (Jean Carassus “The construction sector system approach: an international framework. Report by CIB W55-W65 Construction Industry Comparative Analysis Project Group” 2004, CIB Rotterdam , 153 p)
26. **Construction Industry**: An industry concerning Construction Works; involves the construction, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling, or demolition of any building, erection, edifice, structure, wall, fence, or chimney, whether constructed wholly or partly above or below ground level; any road, harbour works, railway, cableway, canal or aerodrome; any drainage, irrigation or river control works; any electrical, mechanical, water, gas, petrochemical or telecommunication works; or any bridge, viaduct, dam, reservoir, earthworks, pipeline, sewer, aqueduct, culvert, drive, shaft, tunnel or reclamation works, and includes any works' which form an integral part of, including site clearance, soil investigation and improvement, earth-moving, excavation, laying of the foundation, site restoration and landscaping. NCA 2020 (National Construction Agency “ Construction Industry Outlook: Industry Statistics and Trends 2020, Kenya, 54 p)
27. The **construction industry** is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-

Definitions of the “construction” and “construction industry”

economic development. It embraces the process by which the said physical infrastructure are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished. The constructed infrastructure include:

- Buildings
- Transportation systems and facilities which are airports, harbours, highways, subways, bridges, railroads, transit systems, pipelines and transmission and power lines.
- Structures for fluid containment, control and distribution such as water treatment and distribution, sewage collection and treatment distribution systems, sedimentation lagoons, dams, and irrigation and canal systems.
- Underground structures, such as tunnels and mines.

The industry comprises of organizations and persons who include companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, builders and merchants. The industry has a close relationship with clients and financiers. The government is involved in the industry as purchaser (client), financier, regulator and operator. NCC 2004-2005 (National Construction Council (NCC) “Construction Industry Policy” 2004-2005, Ministry Of works , Tanzania 37 p)

28. **The construction industry** is composed of three distinct industry sectors. These sectors are engineering construction, non-residential building, and residential building. De Valence 2010 (Gerard de Valence “Defining an Industry: What is the size and scope of the Australian Building and Construction Industry?” July 2010, The Australian Journal of Construction Economics & Building, p53-65)
29. The **construction sector** contains the range of construction products, companies, and construction services firms:
 - Construction companies are involved in developing advances building materials, off-site construction, timber products, building systems, insulation products and a range of fittings used in construction and building fit-out;
 - Construction service firms operate across civil and structural engineering and contracting, mechanical and electrical contracting power, energy maintenance and generation, quantity surveying and consulting.

”Focus on Construction December 2018”, Department of business, enterprise and innovation, Government of Ireland.
30. **The construction industry** is a vital component of every OECD economy. The construction sector is responsible for building new houses, apartments, factories, offices and schools. It also builds roads, bridges, ports, railroads, sewers and tunnels, among many other things. In addition, it maintains and repairs all of those structures and produces the basic materials such as concrete that are used to make them. OECD report 2008, (Organisation for Economic Co-operation and Development “Competition in the construction industry”, DAF/COMP(2008)36, 156p)

Interviews with 4 construction industries experts (extracts).

Interviews³ were conducted during the end of 2020 and beginning of 2021.

Author presented his findings on definition of the terms construction and construction industry. Two experts recommended to add few definitions from the two recent years, and it was done. Experts were asked to list main activities covered by the terms “construction” and “construction industry”, and to provide their definition of the construction company. Author discussed with the experts an essence of each topic.

Nr	Topic	Expert’s answer
1	Opinion 1	Expert 1 – board member of the construction company, 20 years of experience.
1.1	Main activities covered by term “construction”	Civil buildings, internal and external networks, roads, bridges, onshore and offshore construction, landscaping,.
1.2	Main activities covered by term “construction industry”	Civil buildings, internal and external networks, roads, bridges, onshore and offshore construction, landscaping, maintenance, material production, research and development, design.
1.3	Definition of the construction company	Company operating in construction industry as general contractor, subcontractor, or supplier.
2	Opinion 2	Expert 2 – board member of the construction company, 16 years of experience.
2.1	Main activities covered by term “construction”	Civil, infrastructure, marine construction or reconstruction works.
2.2	Main activities covered by term “construction industry”	Civil, infrastructure, marine construction or reconstruction works, design, construction material production.
2.3	Definition of the construction company	Company operating is capable to perform civil, infrastructure, marine construction/reconstruction, design works or produce construction materials on time and keeping necessary quality.
3	Opinion 3	Expert 3 – board member of the construction company, 7 years of experience.
3.1	Main activities covered by term “construction”	Actual works of building/reconstructing/demolishing roads, bridges, tunnels, buildings, underground structures, utilities, and other related works
3.2	Main activities covered by term “construction industry”	Construction/reconstruction, demolition, design, or maintenance of roads, bridges, tunnels, buildings, underground structures, utilities and related works.

³ According to K.T.Ulrich and S.D.Eppinger, “Product design and development”, 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

APPENDIX 6 CONTINUED

Definitions of the “construction” and “construction industry”

3.3	Definition of the construction company	Companies operating in the fields of construction/reconstruction, demolishing, design or maintenance of roads, bridges, tunnels, buildings, underground structures, utilities and related works.
4	Opinion 4	Expert 4 - technical director of the construction company, 18 years of experience.
4.1	Main activities covered by term “construction”	Implementation of designed dwelling houses, offices, or industrial buildings, infrastructure and marine structures, and/or networks, including all necessary works.
4.2	Main activities covered by term “construction industry”	Design, construction or reconstruction, maintenance of dwelling houses, offices, or industrial building, infrastructure and marine structures, and networks, including all necessary works. Building materials production.
4.3	Definition of the construction company	Company that obtains resources, knowledge, and capacities to design, to construct or to reconstruct, to maintain dwelling houses, offices, or industrial building, infrastructure and marine structures, and networks, including all necessary works. Building materials manufacturers.
5	Topic	Author suggested and experts approved scope of activities and definitions of the terms used.
5.1	Scope of main activities covered by the term “construction”	<ul style="list-style-type: none"> • Civil objects- includes dwelling, offices, warehouses, industrial and public buildings, including internal networks and necessary landscaping works etc.; • Infrastructure – roads, marine onshore and offshore structures, bridges, external networks, airports, railways, subway, tunnels, etc.; • New construction – projects built as a “green field”, including design works; • Repair/reconstruction – works carried out in existing structure/building, including demolition, and design works;
5.2	Scope of main activities covered by the term “construction industry”	<ul style="list-style-type: none"> • Civil- includes dwelling, offices, warehouses, industrial and public buildings, including internal networks and necessary landscaping works etc.; • Infrastructure – roads, marine onshore and offshore structures, bridges, external networks, airports, railways, subway, tunnels, etc.; • New construction – projects built as a “green field”, including design works; • Repair/reconstruction – works carried out in existing structure/building, including demolition, and design works; • Material production – facilities needed to produce building materials;

APPENDIX 6 CONTINUED

Definitions of the “construction” and “construction industry”

		<ul style="list-style-type: none">• Maintenance – activities performed for operation of the building/structure/utility after the construction works are completed.
6	Topic	Author suggested and experts approved definition of the construction company.
6.1	Construction company	A company that operates in the construction industry (sector), while it is managing and/or performing construction, demolition, reconstruction, maintenance and/or design works that result in creation of the operable building and/or structure and/or plot (or part thereof) according to the Clients ideas and/or needs, while fulfilling the requirements set by laws and regulating normative acts

prepared by Jevgenijs Locovs

	Country	GDP EUR (bln)											
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020
	EU 28 total	USD	USD	USD	USD	USD	USD	USD	USD	USD	USD	USD	EUR
1	Austria	\$391 892 746,55	\$431 120 310,09	\$409 425 234,15	\$430 068 712,98	\$441 996 131,74	\$381 817 565,90	\$395 568 644,35	\$416 207 272,21	\$454 872 626,79	\$445 075 391,69	\$428 965 397,96	€353 028 884,83
2	Belgium	\$480 951 629,50	\$522 645 519,19	\$496 181 260,26	\$521 642 714,41	\$534 678 075,83	\$462 149 679,35	\$475 739 588,77	\$501 522 868,36	\$543 410 654,02	\$533 254 518,11	\$515 332 499,63	€424 107 069,07
3	Bulgaria	\$50 381 825,51	\$57 386 216,86	\$54 033 250,33	\$55 615 397,67	\$56 901 994,98	\$50 647 442,76	\$53 806 894,80	\$58 971 520,60	\$66 230 155,10	\$68 558 815,11	\$69 105 101,09	€56 871 945,59
4	Croatia	\$59 918 313,67	\$62 537 851,35	\$56 580 819,62	\$58 194 069,44	\$57 639 588,80	\$49 525 747,50	\$51 601 147,67	\$55 481 644,10	\$61 375 222,35	\$60 752 588,98	\$55 966 581,78	€46 059 239,39
5	Cyprus	\$25 732 432,72	\$27 565 469,10	\$24 978 513,43	\$23 900 872,63	\$23 156 850,01	\$19 842 404,30	\$20 953 442,55	\$22 729 184,37	\$25 309 818,14	\$24 949 065,26	\$23 804 340,38	€19 590 437,31
6	Czech Republic	\$209 069 940,97	\$229 562 733,40	\$2 088 577 190,32	\$211 685 616,60	\$209 358 834,16	\$188 033 050,46	\$196 272 068,58	\$218 628 940,95	\$248 950 103,35	\$250 686 478,65	\$243 530 379,90	€200 420 031,19
7	Denmark	\$321 995 279,40	\$344 003 137,61	\$327 148 943,81	\$343 584 391,65	\$352 993 631,62	\$302 673 070,85	\$313 115 929,31	\$332 121 063,81	\$356 879 499,80	\$350 104 327,66	\$355 184 024,84	€292 308 472,42
8	Estonia	\$19 685 038,57	\$23 394 844,09	\$23 192 708,98	\$25 271 406,71	\$26 773 473,63	\$23 048 864,24	\$24 259 552,89	\$26 885 077,01	\$30 616 184,21	\$31 471 100,66	\$31 029 968,60	€25 536 967,00
9	Finland	\$249 181 190,48	\$275 243 697,76	\$258 304 834,62	\$271 285 280,62	\$274 497 230,80	\$234 440 080,99	\$240 607 907,01	\$255 016 517,54	\$275 849 574,51	\$268 966 065,20	\$271 233 883,40	€223 219 392,15
10	France	\$2 642 609 548,93	\$2 861 408 170,26	\$2 683 825 225,09	\$2 811 077 725,70	\$2 852 165 760,63	\$2 438 207 896,25	\$2 471 285 607,08	\$2 588 740 901,64	\$2 786 502 569,56	\$2 715 518 274,23	\$2 603 004 395,90	€2 142 214 135,38
11	Germany	\$3 396 354 075,66	\$3 744 408 602,68	\$3 527 344 944,14	\$3 732 743 446,22	\$3 883 920 155,29	\$3 356 235 704,12	\$3 467 498 002,10	\$3 673 506 280,84	\$3 961 831 911,43	\$3 861 123 558,03	\$3 806 060 140,12	€3 132 301 983,47
12	Greece	\$296 835 346,57	\$282 625 610,89	\$242 053 529,23	\$238 484 046,04	\$235 295 470,07	\$195 317 994,38	\$192 732 474,23	\$199 630 819,05	\$212 146 107,55	\$205 326 724,57	\$189 410 106,62	€155 880 262,22
13	Hungary	\$131 916 516,05	\$141 759 722,46	\$128 475 498,38	\$135 411 698,97	\$140 765 018,88	\$125 074 286,02	\$128 470 534,12	\$142 961 605,73	\$160 431 092,91	\$163 503 650,31	\$155 012 927,63	€127 572 156,72
14	Ireland	\$222 071 182,06	\$237 644 567,33	\$224 984 397,51	\$238 483 849,53	\$258 909 619,17	\$291 521 892,63	\$299 556 360,84	\$338 503 196,94	\$385 967 106,12	\$398 590 210,12	\$418 621 818,48	€344 516 351,31
15	Italy	\$2 134 017 843,25	\$2 291 991 045,77	\$2 087 077 032,44	\$2 141 315 327,32	\$2 159 133 919,74	\$1 835 899 237,32	\$1 875 797 463,58	\$1 956 950 469,67	\$2 091 117 091,12	\$2 004 913 357,80	\$1 886 445 268,34	€1 552 502 072,54
16	Latvia	\$23 869 752,33	\$28 374 734,04	\$28 324 787,66	\$30 436 727,79	\$31 329 367,17	\$27 239 653,84	\$28 052 325,86	\$30 383 528,68	\$34 399 206,59	\$34 055 464,65	\$33 505 185,23	€27 574 014,67
17	Lithuania	\$37 128 694,02	\$43 535 051,48	\$42 927 454,29	\$46 523 420,07	\$48 533 659,59	\$41 418 872,97	\$43 018 087,24	\$47 640 770,63	\$53 696 648,75	\$54 639 938,78	\$55 887 271,83	€45 993 969,08
18	Luxembourg	\$53 212 476,81	\$60 004 630,23	\$56 677 961,78	\$61 739 352,21	\$66 103 853,24	\$57 744 457,95	\$60 691 483,44	\$64 023 412,34	\$70 885 325,88	\$71 104 919,11	\$73 263 982,10	€60 294 611,23
19	Malta	\$9 035 932,12	\$9 638 916,48	\$9 462 238,21	\$10 551 661,17	\$11 626 281,38	\$11 091 434,48	\$11 721 521,91	\$13 221 298,31	\$14 864 712,99	\$15 215 714,31	\$14 647 384,61	€12 054 468,45
20	Netherlands	\$846 554 894,93	\$904 085 980,79	\$838 971 306,99	\$876 923 518,85	\$890 981 311,07	\$765 264 949,78	\$783 528 181,70	\$831 809 944,96	\$913 597 086,06	\$907 050 863,14	\$912 242 335,12	€750 754 946,19
21	Poland	\$479 834 179,02	\$528 301 269,07	\$498 523 568,25	\$521 016 262,73	\$542 477 096,21	\$477 811 911,39	\$472 630 364,20	\$526 508 877,30	\$587 408 980,27	\$595 862 086,93	\$594 164 690,89	€488 984 191,33
22	Portugal	\$237 880 908,32	\$244 797 226,56	\$216 236 608,77	\$226 369 502,10	\$229 596 170,85	\$199 313 894,33	\$206 286 022,78	\$220 811 110,49	\$242 194 788,53	\$239 510 770,95	\$231 255 587,27	€190 318 152,64
23	Romania	\$166 309 355,23	\$183 326 740,14	\$170 635 805,32	\$190 801 346,19	\$199 959 363,43	\$177 729 210,87	\$188 128 818,48	\$211 695 422,57	\$241 457 403,08	\$249 696 854,57	\$248 715 551,36	€204 687 310,81
24	Slovak Republic	\$90 310 718,35	\$99 122 802,87	\$94 534 730,68	\$98 848 641,55	\$101 189 715,75	\$88 467 555,24	\$89 655 253,97	\$95 209 466,45	\$105 474 651,20	\$105 119 160,23	\$104 574 146,24	€86 062 172,86
25	Slovenia	\$48 161 250,40	\$51 516 366,65	\$46 580 457,47	\$48 401 896,80	\$49 930 685,01	\$43 090 173,39	\$44 736 333,52	\$48 466 592,28	\$54 135 187,44	\$54 174 227,30	\$52 880 473,70	€43 519 441,77
26	Spain	\$1 420 722 034,06	\$1 478 772 824,22	\$1 324 820 091,19	\$1 354 757 433,21	\$1 369 398 844,59	\$1 195 119 269,97	\$1 232 076 017,36	\$1 309 297 246,50	\$1 421 459 363,68	\$1 393 490 524,51	\$1 281 199 091,01	€1 054 398 066,83
27	Sweden	\$495 812 558,84	\$574 094 112,97	\$552 483 727,28	\$586 841 821,79	\$581 964 017,23	\$505 103 781,35	\$515 654 671,46	\$541 018 749,76	\$555 455 371,48	\$531 283 304,45	\$537 609 865,71	€442 440 840,84
28	United Kingdom	\$2 481 579 504,99	\$2 659 882 040,93	\$2 704 017 284,86	\$2 783 251 090,19	\$3 065 521 109,39	\$2 932 784 751,84	\$2 693 247 611,03	\$2 662 484 018,73	\$2 857 316 524,86	\$2 830 813 507,74	\$2 707 743 777,17	€2 228 412 292,96

<https://sdw.ecb.europa.eu/curConverter.do?sourceAmount=1.0&sourceCurrency=USD&targetCurrency=EUR&inputDate=03-12-2018&submitConvert.x=68&submitConvert.y=13>

Date	Original Amount	Converted Amount	Rate
03/12/2020	428965397.00 USD	353028884.04 EUR	1 EUR = 1,2151 USD
			1,2151

Appendix 7 continued
Statistics

	Country	Population (mln)										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	EU 28 total	503 170 618	502 964 837	504 047 749	505 163 053	507 235 091	508 520 205	510 181 874	511 378 572	512 482 133	513 093 556	514 345 371
1	Austria	8 351 643	8 375 164	8 408 121	8 451 860	8 507 786	8 584 926	8 700 471	8 772 865	8 822 267	8 858 775	8 901 064
2	Belgium	10 839 905	11 000 638	11 075 889	11 137 974	11 180 840	11 237 274	11 311 117	11 351 727	11 398 589	11 455 519	11 522 440
3	Bulgaria	7 421 766	7 369 431	7 327 224	7 284 552	7 245 677	7 202 198	7 153 784	7 101 859	7 050 034	7 000 039	6 951 482
4	Croatia	4 302 847	4 289 857	4 275 984	4 262 140	4 246 809	4 225 316	4 190 669	4 154 213	4 105 493	4 076 246	4 058 165
5	Cyprus	819 140	839 751	862 011	865 878	858 000	847 008	848 319	854 802	864 236	875 899	888 005
6	Czech Republic	10 462 088	10 486 731	10 505 445	10 516 125	10 512 419	10 538 275	10 553 843	10 578 820	10 610 055	10 649 800	10 693 939
7	Denmark	5 534 738	5 560 628	5 580 516	5 602 628	5 627 235	5 659 715	5 707 251	5 748 769	5 781 190	5 806 081	5 822 763
8	Estonia	1 333 290	1 329 660	1 325 217	1 320 174	1 315 819	1 314 870	1 315 944	1 315 635	1 319 133	1 324 820	1 328 889
9	Finland	5 351 427	5 375 276	5 401 267	5 426 674	5 451 270	5 471 753	5 487 308	5 503 297	5 513 130	5 517 919	5 525 292
10	France	64 658 856	64 978 721	65 276 983	65 600 350	66 165 980	66 458 153	66 638 391	66 809 816	67 026 224	67 177 636	67 320 216
11	Germany	81 802 257	80 222 065	80 327 900	80 523 746	80 767 463	81 197 537	82 175 684	82 521 653	82 792 351	83 019 213	83 166 711
12	Greece	11 119 289	11 123 392	11 086 406	11 003 615	10 926 807	10 858 018	10 783 748	10 768 193	10 741 165	10 724 599	10 718 565
13	Hungary	10 014 324	9 985 722	9 931 925	9 908 798	9 877 365	9 855 571	9 830 485	9 797 561	9 778 371	9 772 756	9 769 526
14	Ireland	4 549 428	4 570 881	4 589 287	4 609 779	4 637 852	4 677 627	4 726 286	4 784 383	4 830 392	4 904 240	4 964 440
15	Italy	59 190 143	59 364 690	59 394 207	59 685 227	60 782 668	60 795 612	60 665 551	60 589 445	60 483 973	59 816 673	59 641 488
16	Latvia	2 120 504	2 074 605	2 044 813	2 023 825	2 001 468	1 986 096	1 968 957	1 950 116	1 934 379	1 919 968	1 907 675
17	Lithuania	3 141 976	3 052 588	3 003 641	2 971 905	2 943 472	2 921 262	2 888 558	2 847 904	2 808 901	2 794 184	2 794 090
18	Luxembourg	502 066	511 840	524 853	537 039	549 680	562 958	576 249	590 667	602 005	613 894	626 108
19	Malta	414 027	414 989	417 546	422 509	429 424	439 691	450 415	460 297	475 701	493 559	514 564
20	Netherlands	16 574 989	16 655 799	16 730 348	16 779 575	16 829 289	16 900 726	16 979 120	17 081 507	17 181 084	17 282 163	17 407 585
21	Poland	38 022 869	38 062 718	38 063 792	38 062 535	38 017 856	38 005 614	37 967 209	37 972 964	37 976 687	37 972 812	37 958 138
22	Portugal	10 573 479	10 572 721	10 542 398	10 487 289	10 427 301	10 374 822	10 341 330	10 309 573	10 291 027	10 276 617	10 295 909
23	Romania	20 294 683	20 199 059	20 095 996	20 020 074	19 947 311	19 870 647	19 760 585	19 643 949	19 533 481	19 414 458	19 328 838
24	Slovak Republic	5 390 410	5 392 446	5 404 322	5 410 836	5 415 949	5 421 349	5 426 252	5 435 343	5 443 120	5 450 421	5 457 873
25	Slovenia	2 046 976	2 050 189	2 055 496	2 058 821	2 061 085	2 062 874	2 064 188	2 065 895	2 066 880	2 080 908	2 095 861
26	Spain	46 486 619	46 667 174	46 818 219	46 727 890	46 512 199	46 449 565	46 440 099	46 528 024	46 658 447	46 937 060	47 332 614
27	Sweden	9 340 682	9 415 570	9 482 855	9 555 893	9 644 864	9 747 355	9 851 017	9 995 153	10 120 242	10 230 185	10 327 589
28	United Kingdom	62 510 197	63 022 532	63 495 088	63 905 342	64 351 203	64 853 393	65 379 044	65 844 142	66 273 576	66 647 112	67 025 542

<https://ec.europa.eu/eurostat/databrowser/bookmark/748d68cd-b218-4ec0-9d08-14daf3392532?lang=en>

01/10/2021

Appendix 7
continued
Statistics

https://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK_DS-120935_QID_-5192B486_UID_ 26/10/2021

country		Number of enterprises operating in the construction industry										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	EU 28 total	3 233 572	3 290 721	3 302 249	3 290 255	3 445 604	3 409 659	3 512 568	3 523 557	3 624 803	3 413 290	3 024 656
1	Austria	31 196	31 573	32 174	33 518	34 227	34 564	35 078	36 157	35 872	36 707	35 861
2	Belgium	92 203	95 117	95 549	96 791	105 998	102 699	106 444	114 645	105 253	120 581	123 863
3	Bulgaria	21 164	19 543	19 068	18 738	18 908	19 367	19 526	19 889	20 312	20 985	21 469
4	Croatia	24 671	21 987	20 170	19 236	18 359	17 575	17 598	17 994	18 826	22 959	24 043
5	Cyprus	9 599	9 266	8 640	7 603	7 197	7 399	7 330	7 886	8 461	9 001	9 301
6	Czechia	173 872	176 251	175 799	170 494	170 806	172 479	174 910	177 390	181 647	183 632	183 784
7	Denmark	31 588	31 575	31 300	30 707	31 281	31 197	31 973	32 643	33 306	33 937	34 976
8	Estonia	7 446	7 888	8 376	8 870	9 029	9 500	10 167	10 931	11 587	12 448	12 943
9	Finland	42 485	42 785	42 781	42 844	41 827	41 616	40 891	41 110	40 809	41 403	42 048
10	France	456 747	464 125	512 864	536 488	575 733	494 099	507 048	468 974	472 425	486 876	499 302
11	Germany	238 924	243 115	274 002	267 849	338 535	332 411	358 919	338 475	357 187	376 853	394 639
12	Greece	:	92 699	86 873	84 622	86 992	74 337	77 229	61 833	59 782	61 720	61 511
13	Hungary	67 354	65 322	60 284	55 471	56 765	60 724	63 871	69 658	79 218	93 130	99 593
14	Ireland	52 607	50 256	49 530	48 502	47 349	50 546	51 568	57 255	57 626	59 175	58 251
15	Italy	607 771	590 555	572 412	549 846	529 103	511 405	508 696	502 775	493 674	479 574	n/a
16	Latvia	6 874	6 579	8 000	8 767	9 424	11 057	11 752	11 590	11 635	11 658	11 517
17	Lithuania	12 201	16 995	20 242	22 736	27 543	29 067	31 151	31 708	32 535	33 036	32 937
18	Luxembourg	3 220	3 300	3 365	3 512	3 542	3 634	3 760	3 930	4 077	4 303	4 245
19	Malta	4 034	3 924	3 835	3 623	3 758	3 646	3 949	3 906	4 383	4 308	5 132
20	Netherlands	127 684	128 189	134 589	152 519	154 748	160 728	167 022	173 775	187 654	203 549	217 460
21	Poland	233 019	239 232	233 731	223 794	230 497	244 361	264 440	281 953	325 663	355 562	387 831
22	Portugal	105 463	97 980	87 592	81 335	77 844	77 906	78 866	81 629	85 311	90 430	94 377
23	Romania	49 348	43 503	44 607	45 382	47 813	48 341	49 717	52 792	55 948	60 047	66 247
24	Slovakia	91 432	90 886	86 412	81 902	85 907	85 016	87 665	95 114	101 797	109 133	100 794
25	Slovenia	19 190	18 940	18 392	18 066	18 133	18 289	18 706	18 668	19 039	19 600	20 267
26	Spain	371 025	342 257	320 872	320 086	346 822	377 795	367 601	376 235	380 029	382 186	379 199
27	Sweden	87 119	91 540	93 598	94 368	96 694	98 925	101 868	104 097	99 155	100 497	103 066
28	United Kingdom	265 336	265 339	257 192	262 586	270 770	290 976	314 823	330 545	341 592	n/a	n/a

Data for Italy 2017 and Greece 2008, 2010 was a taken as an data's average of the closest years

https://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK_DS-120939_QID_-6CCF0770_UID_-3F171EBO&layout=TIME,C,X,0;GEO,L,Y,0;NACE_R2,L,Z,0;INDIC_SB,L,Z,1;SIZE_EMP,L,Z,2;INDICATORS,C,Z,3;&zSelection=DS-120939NACE_R2,F;DS-120939INDICATORS,OBS_FLAG;DS-120939INDIC_SB,V16110;DS-120939SIZE_EMP,TOTAL;&rankName1=INDICATORS_1_2_-1_2&rankName2=NACE-R2_1_2_-1_2&rankName3=INDIC-SB_1_2_-1_2&rankName4=SIZE-EMP_1_2_-1_2&rankName5=TIME_1_0_0_0&rankName6=GEO_1_2_0_1&sortC=ASC_-1_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&cDM=true&footnes=false&empty=false&wai=false&time_mode=ROLLING&time_most_recent=false&lang=EN&cfo=%23%23%23%2C%23%23%23.%23%23%23

**Appendix 7
continued**

14/01/2021 Statistics

country		Total number of employees in the construction industry										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	EU 28 total	13 554 097	13 064 445	12 750 422	12 260 121	12 528 423	12 334 692	12 690 460	13 052 841	13 673 416	12 522 816	11 004 832
1	Austria	274 274	278 788	285 320	283 165	288 074	287 944	292 359	301 204	318 393	328 025	327 596
2	Belgium	304 316	312 702	317 544	314 116	323 140	312 862	318 302	335 695	319 561	335 160	292 418
3	Bulgaria	169 254	161 500	150 381	145 504	147 163	147 247	142 663	146 595	151 074	156 179	153 902
4	Croatia	136 560	120 587	111 447	106 214	102 296	99 790	98 850	102 462	105 416	119 702	126 422
5	Cyprus	35 842	33 312	28 486	21 309	18 514	19 390	21 364	26 124	30 769	34 381	35 364
6	Czechia	410 446	399 286	395 214	376 377	368 547	369 283	367 291	370 024	375 994	381 643	382 478
7	Denmark	147 747	165 028	166 230	164 878	169 288	175 916	168 959	175 443	183 514	18 276	191 382
8	Estonia	38 622	41 937	43 437	44 157	43 597	44 195	46 239	47 739	50 119	52 179	51 405
9	Finland	173 134	180 529	182 778	190 164	189 792	187 697	192 361	203 056	206 949	211 046	207 879
10	France	1 793 283	1 760 098	1 772 057	1 705 993	1 813 280	1 529 502	1 651 096	1 675 716	1 715 599	1 759 286	n/a
11	Germany	1 638 901	1 801 319	1 962 860	1 971 082	2 202 152	2 201 393	2 272 627	2 304 882	2 474 944	2 643 029	2 742 093
12	Greece	242 711	216 004	197 363	193 633	164 610	132 071	145 060	124 261	148 178	142 259	144 094
13	Hungary	212 730	206 798	198 317	187 872	194 532	202 162	206 521	216 068	240 855	271 031	277 529
14	Ireland	104 545	94 640	89 351	91 122	99 860	108 720	120 341	137 239	144 521	158 227	148 277
15	Italy	1 821 884	1 658 632	1 553 237	1 445 485	1 356 571	1 323 568	1 324 178	1 314 006	1 309 288	1 319 155	1 327 362
16	Latvia	52 954	52 537	59 775	61 248	68 027	67 431	63 450	66 457	72 336	70 252	70 043
17	Lithuania	81 305	89 313	93 448	96 779	103 218	105 806	105 014	107 218	109 242	113 450	115 275
18	Luxembourg	39 893	40 629	41 066	41 092	41 694	42 453	43 750	45 019	46 935	49 028	50 563
19	Malta	10 323	10 625	10 217	10 232	9 992	10 716	10 851	10 553	11 471	13 144	13 816
20	Netherlands	489 381	486 172	474 618	450 148	429 255	431 194	435 174	449 617	471 054	493 119	507 635
21	Poland	902 247	924 870	890 864	830 679	831 226	850 090	889 264	908 972	1 005 742	1 065 139	1 116 025
22	Portugal	444 669	403 575	340 913	307 907	294 458	297 344	301 862	312 914	328 053	353 398	364 102
23	Romania	402 868	425 756	410 340	378 331	365 320	374 917	373 779	362 741	365 146	407 008	443 361
24	Slovakia	176 323	67 719	153 110	144 544	151 015	151 013	152 398	164 604	172 179	179 153	165 220
25	Slovenia	77 901	68 966	62 357	60 852	60 690	62 049	61 113	62 421	67 309	73 280	74 556
26	Spain	1 659 525	1 323 371	1 112 233	982 095	991 202	1 059 440	1 095 710	1 150 639	1 276 058	1 337 009	1 243 320
27	Sweden	330 615	350 831	353 468	353 646	363 586	379 905	394 421	413 004	441 827	439 258	432 715
28	United Kingdom	1 381 844	1 388 921	1 293 991	1 301 497	1 337 324	1 360 594	1 395 463	1 518 168	1 530 890	n/a	n/a

Data for Greece 2008 was taken as an data's average of the closest years

https://appsso.eurostat.ec.europa.eu/hui/show.do?query=BOOKMARK_DS-120935_QID_3F0D557F_UID_-3F171EB0&layout=TIME,C,X,0;GEO,L,Y,0;NACE_R2,L,Z,0;INDIC_SB,L,Z,1;INDICATORS,C,Z,2;&zSelection=DS-120935NACE_R2,F;DS-120935INDIC_SB,V,12110;DS-120935INDICATORS,OBS_FLAG;&rankName1=INDICATORS_1_2_-1_2&rankName2=NACE-R2_1_2_-1_2&rankName3=INDIC-SB_1_2_-1_2&rankName4=TIME_1_0_0_0&rankName5=GEO_1_2_0_1&sortC=ASC_1_1_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&footnes=false&empty=false&wai=false&time_mode=NONE&time_most_recent=false&lang=EN&cf o=%23%23%23%23%23%23%23%23%23%23%23%23%23

13/04/2022 million EUR

Appendix 7
continued
Statistics

country	Turnover of the construction industry.												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU 28 total	1 940 462,6	1 617 637,9	1 566 369,1	1 572 781,9	1 545 324,8	1 494 483,1	1 577 230,7	1 652 432,8	1 575 681,7	1 717 577,0	1 893 406,8	2 019 504,9	2 008 204,3
1 Austria	40 560,3	39 648,7	40 243,5	40 548,9	42 577,1	43 400,7	43 341,6	45 190,5	46 819,8	48 499,6	53 616,0	56 619,5	55 793,1
2 Belgium	51 609,1	51 845,8	56 074,0	60 790,1	61 178,2	59 294,5	62 065,0	65 297,3	7 044,4	72 795,6	69 100,7	75 988,4	77 102,2
3 Bulgaria	10 338,5	9 812,2	6 988,4	7 000,1	7 169,3	6 848,8	7 924,5	9 317,2	5 802,8	6 818,0	7 847,4	8 689,1	11 769,4
4 Croatia	10 519,4	9 312,9	7 063,5	6 187,8	5 459,8	5 262,9	5 062,4	5 427,9	5 704,9	5 922,6	6 602,9	7 840,9	7 781,6
5 Cyprus	4 424,2	3 625,6	6 324,1	3 154,6	2 568,0	1 908,9	1 789,4	1 892,1	2 341,7	2 972,0	3 571,4	4 328,7	4 031,3
6 Czechia	35 362,5	31 318,9	32 426,8	31 531,0	27 923,1	25 856,3	25 390,5	27 424,1	25 964,3	28 856,7	33 321,7	35 737,5	34 963,0
7 Denmark	32 307,4	25 542,1	22 698,1	25 295,2	26 933,0	26 499,1	28 316,2	30 876,8	33 171,6	34 994,4	37 046,6	39 106,5	40 325,5
8 Estonia	4 466,4	2 824,7	2 435,6	3 120,6	3 898,5	4 176,5	3 910,3	3 938,7	4 174,1	4 939,0	5 664,9	6 244,9	5 896,7
9 Finland	27 094,7	24 297,5	24 153,6	27 076,2	28 884,6	28 497,5	28 998,4	30 270,0	32 786,3	36 265,7	37 722,5	39 730,8	40 347,8
10 France	274 057,5	250 419,7	257 148,3	272 148,3	282 147,1	284 341,7	288 852,7	274 126,3	276 542,7	287 564,0	305 652,2	331 315,3	304 243,5
11 Germany	170 078,6	168 244,9	170 822,3	195 659,1	211 333,3	215 203,4	241 201,4	241 529,7	250 269,0	263 823,5	303 190,7	333 069,4	371 114,3
12 Greece	23 778,3	15 852,2	13 780,9	11 709,6	11 254,2	10 840,9	9 932,9	10 368,0	9 249,3	9 886,6	10 074,7	10 564,1	9 581,4
13 Hungary	17 245,2	14 138,6	12 617,5	11 777,3	10 442,1	11 303,9	13 044,0	14 038,9	11 975,6	15 906,1	20 535,2	24 122,2	22 215,9
14 Ireland	38 090,6	24 070,2	17 712,9	15 577,4	8 797,4	9 996,7	14 208,2	14 944,7	19 428,2	24 868,7	29 152,9	33 700,6	31 004,6
15 Italy	273 614,5	181 150,4	207 545,8	201 072,3	194 737,4	173 240,6	170 611,6	161 921,5	159 896,6	158 553,3	161 510,6	165 236,1	155 245,0
16 Latvia	5 868,2	3 303,4	2 714,9	3 189,1	3 868,2	4 210,8	4 177,2	4 006,5	3 033,6	3 892,6	4 699,0	4 874,4	4 474,3
17 Lithuania	6 347,7	2 803,9	2 848,4	3 522,2	3 608,3	4 077,3	4 920,4	4 887,6	4 634,6	5 331,1	6 188,6	6 886,7	7 116,9
18 Luxembourg	5 730,3	5 330,1	5 442,4	5 823,9	5 977,8	6 212,8	6 887,9	6 814,5	7 635,3	7 917,9	8 609,5	9 217,3	8 830,1
19 Malta	682,8	731,6	746,4	758,7	796,1	801,3	947,7	1 115,5		1 214,3	1 264,9	1 515,7	1 480,0
20 Netherlands	100 301,3	93 554,8	86 067,5	89 679,7	82 483,2	77 587,3	79 287,0	83 492,8	89 633,3	96 437,3	104 695,6	114 561,2	119 460,4
21 Poland	62 262,4	54 001,9	60 427,9	65 556,9	58 112,8	56 744,6	59 925,2	61 623,4	58 905,4	64 674,9	81 403,9	89 073,3	89 736,0
22 Portugal	36 276,7	34 719,8	34 863,2	29 121,9	22 043,2	19 495,7	18 134,4	17 953,3	17 490,7	19 413,6	21 212,5	23 256,2	23 662,8
23 Romania	25 345,3	18 806,2	17 300,7	18 371,3	17 428,7	15 587,0	15 365,4	17 991,0	16 026,0	16 380,9	18 832,1	23 719,7	26 664,5
24 Slovakia	7 555,6	6 461,3	8 965,1	9 075,8	7 731,1	6 708,2	8 030,8	10 170,0	9 657,1	10 641,0	11 862,8	12 546,7	11 375,5
25 Slovenia	8 440,0	6 831,3	6 023,6	5 191,1	4 827,4	4 430,3	4 787,6	4 593,9	4 304,5	4 842,9	5 953,4	6 299,4	6 337,3
26 Spain	340 995,7	284 383,7	201 118,8	156 247,9	118 555,3	95 389,7	98 546,2	107 914,2	111 369,6	117 805,5	144 900,5	156 502,0	138 232,3
27 Sweden	46 652,3	41 867,3	48 888,3	56 363,8	61 293,4	62 205,2	63 272,7	69 093,4	72 482,4	79 449,4	82 655,5	82 240,2	82 900,8
28 United Kingdom	280 457,1	212 738,2	212 926,6	217 231,1	233 296,2	234 360,5	268 299,1	326 213,0	289 337,9	286 909,8	316 518,1	316 518,1	316 518,1

*data for 2018 year

Data for Malta 2016 was taken as an data's average of the closest years

Data for Greece 2008 was taken as 1,5 of 2009, 2010 was taken as an data's average of the closest years

13/01/2022 full time equ [Labour Cost Per Employee FTE of Construction in Latvia \(nationmaster.com\)](https://www.nationmaster.com)

country		Labour cost per employee FTE - thousand euro per year											
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	EU 28 total	:	:	:	:	:	:	:	:	:	:	:	:
1	Austria	41,3	41,6	42,2	43,1	44,4	46,1	47,5	49,2	50,0	51,0	51,5	52,1
2	Belgium	47,0	49,6	52,6	52,2	54,8	55,8	56,5	58,3	59,4	60,5	61,2	62,0
3	Bulgaria	3,6	4,3	4,4	4,7	4,9	5,2	5,7	6,1	6,1	6,6	6,7	6,9
4	Croatia	13,6	13,2	N/A	12,0	12,2	12,0	11,9	12,6	12,1	12,6	12,4	12,4
5	Cyprus	23,9	23,3	23,7	23,6	22,7	20,1	18,9	18,0	18,1	18,6	17,9	17,6
6	Czechia	15,1	14,2	:	15,6	15,2	14,5	14,0	14,7	15,4	16,6	16,3	16,4
7	Denmark	53,0	57,1	57,3	58,0	59,0	59,6	61,0	61,8	63,5	65,7	65,9	66,7
8	Estonia	13,7	12,0	11,8	12,9	14,3	15,0	15,1	15,7	16,8	17,0	17,2	17,5
9	Finland	44,3	44,7	44,3	44,6	48,3	47,8	48,8	49,9	50,9	51,7	52,0	52,5
10	France	:	49,6	50,9	52,5	52,5	54,3	54,7	53,7	54,8	56,0	56,1	56,5
11	Germany	37,9	38,2	38,4	37,9	37,5	38,0	38,1	39,0	39,8	40,9	40,8	41,0
12	Greece	:	21,2	20,3	20,9	19,3	18,0	16,4	16,5	15,6	18,5	17,4	17,2
13	Hungary	9,3	9,1	8,9	9,3	9,4	9,5	9,1	9,4	9,7	10,7	10,5	10,6
14	Ireland	52,5	52,9	58,8	57,9	39,3	40,3	44,6	52,2	53,2	61,1	59,6	60,4
15	Italy	36,6	38,3	38,0	39,4	41,6	41,1	43,7	43,9	44,4	44,3	44,3	44,7
16	Latvia	8,9	8,0	8,6	9,2	10,4	10,7	9,9	10,7	11,9	11,4	11,7	11,9
17	Lithuania	11,1	8,5	7,7	8,3	8,7	9,5	10,0	10,6	11,7	13,0	12,8	13,0
18	Luxembourg	N/A:	N/A:	N/A:	N/A:	43,1	44,4	45,4	45,9	46,7	48,1	48,1	48,4
19	Malta	14,3	14,7	15,1	15,5	16,1	15,7	16,8	16,4	N/A	18,3	18,3	18,5
20	Netherlands	53,6	52,5	53,7	56,0	56,8	59,2	60,8	60,7	62,8	59,6	61,0	61,4
21	Poland	N/A:	N/A:	N/A:	11,3	11,7	11,8	12,3	12,5	12,4	13,6	13,4	13,6
22	Portugal	14,8	15,0	15,6	16,0	16,1	16,4	16,4	16,4	16,3	16,5	16,6	16,7
23	Romania	5,4	4,8	5,0	5,0	4,9	5,1	5,5	6,2	6,4	7,2	7,1	7,3
24	Slovakia	17,3	18,8	12,0	13,0	12,9	13,0	12,3	12,9	13,6	13,4	13,1	13,0
25	Slovenia	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:	N/A:
26	Spain	32,8	35,0	34,8	34,1	34,3	34,3	34,4	33,5	33,6	34,2	34,1	34,1
27	Sweden	48,2	44,2	49,6	53,3	57,2	58,3	56,6	56,5	57,7	57,9	58,6	59,1
28	United Kingdom	40,3	33,1	37,4	34,6	37,9	36,7	39,1	42,9	38,4	34,9	36,0	35,8

[Cost of Living Index by Country 2019 \(numbeo.com\)](http://numbeo.com)

14/03/2021

country		Cost of living										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	EU28 total											
1	Austria	107.28	95.23	94.84	97.88	89.50	76.87	66.59	71.52	81,47	71,79	70,38
2	Belgium	120.00	109.39	108.68	108.04	100.04	87.22	75.44	75.36	83,35	72,97	71,78
3	Bulgaria	59.82	52.10	50.92	52.68	49.96	43.57	36.36	36.49	41,21	37,17	36,7
4	Croatia	80.66	68.32	67.54	72.24	69.04	58.92	48.20	48.00	55,06	49,18	49,7
5	Cyprus	94.05	90.96	89.54	98.61	89.76	72.52	56.99	54.07	60,32	55,57	57,93
6	Czechia	72.08	60.81	61.44	63.35	56.59	48.50	41.80	41.22	50,09	45,12	46,15
7	Denmark	138.91	119.67	116.52	119.95	114.87	100.60	84.88	83.02	93,3	81,38	83
8	Estonia	N/A	59.23	66.91	70.75	67.33	61.20	48.94	49.50	57,65	51,01	50,93
9	Finland	111.13	98.65	99.69	106.99	103.28	89.68	75.25	73.06	81,7	72,82	70,29
10	France	123.49	101.17	98.19	103.24	100.21	88.37	75.30	74.89	83,86	74,85	74,14
11	Germany	105.53	87.19	88.55	91.64	87.14	76.27	65.54	65.50	74,35	67,62	65,28
12	Greece	77.01	89.81	93.09	92.57	83.79	68.88	54.40	55.87	63,15	56,66	55,67
13	Hungary	64.42	61.49	59.65	63.90	59.27	48.90	41.29	42.77	48,6	42,03	40,85
14	Ireland	119.76	107.11	107.77	112.33	106.61	92.09	78.03	76.98	85,45	75,35	75,91
15	Italy	115.41	95.85	94.82	101.42	96.81	82.72	68.77	83.70	79,06	69,25	67,26
16	Latvia	68.18	70.89	67.76	67.96	65.95	55.94	47.14	47.83	53,42	49,23	47,94
17	Lithuania	50.06	61.81	62.11	63.33	59.96	52.76	45.56	46.73	53,24	45,91	44,28
18	Luxembourg	N/A	N/A	N/A	124.76	109.93	91.78	82.01	77.28	96,56	86,09	81,89
19	Malta	N/A	78.23	83.17	85.61	80.18	68.81	61.36	62.80	70,92	63,62	67,46
20	Netherlands	123.64	105.69	104.50	103.90	98.82	85.98	72.12	72.47	82,69	74,83	73,75
21	Poland	52.62	51.21	49.74	55.64	53.68	45.11	38.53	38.15	45,2	39,13	40,04
22	Portugal	84.67	73.09	70.76	75.31	69.30	58.22	49.83	49.19	55,86	50,39	49,52
23	Romania	45.70	47.68	47.91	51.89	48.20	42.39	34.80	35.63	39,71	36,45	35,31
24	Slovakia	N/A	60.02	59.31	65.72	61.50	51.60	45.00	44.90	50,41	44,98	44,46
25	Slovenia	75.99	72.57	74.34	82.06	75.37	65.15	52.19	53.24	59,65	52,51	53,43
26	Spain	91.28	76.08	80.24	83.14	77.18	65.70	56.11	54.98	61,75	54,7	53,77
27	Sweden	104.15	100.68	101.86	114.47	103.68	82.91	75.70	75.88	83,7	71,55	69,85
28	United Kingdom	107.40	93.80	100.13	102.24	100.11	92.19	81.03	69.49	75,85	65,28	67,28

**Appendix 7
continued
Statistics**

Building permits - m2 of useful floor area

Two- and more dwelling buildings

Unadjusted data (i.e. neither seasonally adjusted nor calendar adjusted data)

14/01/2021

https://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK_DS-069745_QID_-58072254_UID_-3F171EB0&layout=TIME,C,X,0;GEO,L,Y,0;INDIC_BT,L,Z,0;NACE_R2,L,Z,1;S_ADJ,L,Z,2;UNIT,L,Z,3;INDICATORS,C,Z,4;&zSelection=DS-069745UNIT,I15;DS-069745INDICATORS,OBS_FLAG;DS-069745NACE_R2,F_CC112;DS-069745S_ADJ,NSA;DS-069745INDIC_BT,PSQM;&rankName1=INDIC-BT_1_2_-1_2&rankName2=UNIT_1_2_-1_2&rankName3=INDICATORS_1_2_-1_2&rankName4=S-ADJ_1_2_-1_2&rankName5=NACE-R2_1_2_-1_2&rankName6=TIME_1_0_0_0&rankName7=GEO_1_2_0_1&sortC=ASC_1_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&cDM=true&footnes=false&empty=false&wai=false&time_mode=ROLLING&time_most_recent=false&lang=EN&cfo=%23%23%23%2C%23%23%23.%23%23%23

Index, 2015=100

country		change of m2 of useful floor area accorfind to issued building permits (2015=100)										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	EU 28 total	136,4	134,7	112,7	94,3	94,8	100,0	119,8	133,8	137,9	144,7	127,4
1	Austria	65,8	85,1	78,9	90,8	94,4	100,0	116,7	137,9	109,1	127,1	106,8
2	Belgium	94,4	86,7	90,9	101,3	115,9	100,0	108,3	102,6	115,8	94,5	88,7
3	Bulgaria	61,6	51,6	50,0	59,6	86,2	100,0	106,0	148,1	223,0	200,2	177,0
4	Croatia	202,4	204,1	129,9	107,6	109,6	100,0	140,3	188,4	173,9	241,8	220,3
5	Cyprus	542,9	314,3	201,9	132,0	74,2	100,0	140,3	219,9	242,6	585,1	
6	Czechia	165,4	142,6	104,9	84,5	87,7	100,0	114,9	147,7	159,6	191,0	180,3
7	Denmark	50,0	58,8	38,7	33,4	64,8	100,0	131,0	133,4	191,5	153,7	99,9
8	Estonia	34,2	46,6	51,6	47,3	66,7	100,0	105,0	134,3	118,1	137,2	150,2
9	Finland	94,9	105,3	101,6	81,5	93,0	100,0	119,6	148,0	130,1	123,3	
10	France	102,0	124,3	117,8	104,4	92,8	100,0	117,6	124,5	120,5	113,0	92,0
11	Germany	53,9	66,5	75,8	89,4	94,9	100,0	122,2	119,2	122,8	128,7	131,3
12	Greece	940,6	480,7	248,6	132,7	106,4	100,0	111,4	136,7	203,9	272,4	344,5
13	Hungary	142,7	75,1	65,1	48,0	71,7	100,0	311,3	423,1	398,8	376,6	187,0
14	Ireland	236,5	98,5	29,7	46,2	25,9	100,0	124,4	172,2	298,1	592,1	693,6
15	Italy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
16	Latvia	419,7	521,5	401,1	865,1	273,6	100,0	295,4	350,5	521,9	437,1	580,6
17	Lithuania	46,0	43,1	72,9	78,0	71,3	100,0	136,9	129,3	125,5	118,3	99,0
18	Luxembourg	70,6	85,5	94,6	66,8	136,3	100,0	86,4	107,6	134,7	126,1	105,5
19	Malta	106,7	100,4	84,0	75,7	80,9	100,0	187,1	251,1	227,1	216,7	n/a
20	Netherlands	116,5	97,8	63,4	64,1	80,5	100,0	85,1	112,8	83,5	66,3	77,5
21	Poland	77,7	89,5	75,6	60,7	77,0	100,0	110,9	137,2	137,3	142,8	142,5
22	Portugal	407,9	231,2	130,9	69,3	70,1	100,0	160,7	223,4	374,9	428,3	452,1
23	Romania	50,8	39,2	42,9	52,2	74,1	100,0	143,8	168,0	192,2	201,6	185,9
24	Slovakia	88,4	38,7	42,3	73,6	75,6	100,0	127,1	82,8	103,0	110,9	97,7
25	Slovenia	937,7	394,6	291,7	196,9	107,7	100,0	119,4	185,0	358,6	311,0	416,0
26	Spain	249,2	219,0	171,1	85,4	92,9	100,0	197,3	255,6	312,0	382,5	237,1
27	Sweden	49,1	57,1	51,8	65,6	75,2	100,0	120,7	133,6	107,8	88,6	104,1
28	United Kingdom	109,3	103,6	93,7	90,5	96,2	100,0	103,2	106,7	117,0	106,3	n/a

PRODUCTIVITY

Appendix 7
continued
Statistics

country	Turnover of the construction industry (bln)			Number of employees			Output per employee (thousand per year)			Aparent labour productivity (thousands EUR per person employed)		
	2008	2013	2017	2008	2013	2017	2008	2013	2017	2010	2013	2016
EU 28 total	837 926,0	510 747,1	611 079,1	11 704 528	9 695 885	10 053 860	71,6	52,7	60,8	37,0	40,0	43,0
1 Austria	11 212,0	11 940,3	14 840,0	254 011	256 895	263 388	44,1	46,5	56,3	50,7	53,3	57,4
2 Belgium	18 230,2	22 024,1	26 126,6	214 571	210 218	203 452	85,0	104,8	128,4	48,8	50,0	52,5
3 Bulgaria	5 434,2	2 220,1	2 777,4	245 404	133 884	129 742	22,1	16,6	21,4	7,3	8,1	9,7
4 Croatia	4 633,1	2 021,0	2 332,9	145 483	95 231	89 526	31,8	21,2	26,1	16,1	14,6	17,3
5 Cyprus	3 028,4	1 156,2	1 965,5	35 602	19 270	19 754	85,1	60,0	99,5	41,4	27,8	28,9
6 Czechia	15 106,7	9 443,5	10 373,2	271 342	221 473	208 422	55,7	42,6	49,8	N/A	14,7	16,3
7 Denmark	10 276,0	7 254,0	10 834,2	176 900	154 734	152 882	58,1	46,9	70,9	55,1	55,1	66,2
8 Estonia	2 385,0	1 588,1	2 230,6	55 917	42 888	43 532	42,7	37,0	51,2	13,1	20,7	22,2
9 Finland	12 204,6	12 587,6	16 662,4	154 236	160 848	166 207	79,1	78,3	100,3	46,9	48,7	55,0
10 France	64 310,4	67 548,7	72 527,1	1 306 731	1 442 557	1 426 260	49,2	46,8	50,9	47,7	50,8	50,5
11 Germany	41 795,1	55 375,9	61 882,6	1 370 549	1 741 693	1 944 086	30,5	31,8	31,8	41,1	41,1	44,6
12 Greece	7 783,3	4 608,2	2 816,6	96 185	96 185	86 906	80,9	47,9	32,4	N/A	22,4	14,0
13 Hungary	6 098,0	3 961,8	6 163,6	204 256	155 759	167 728	29,9	25,4	36,7	11,2	12,8	12,3
14 Ireland	21 625,5	4 030,6	12 111,2	145 740	58 059	84 956	148,4	69,4	142,6	9,0	39,0	57,5
15 Italy	140 642,5	64 735,7	52 743,2	1 177 242	846 598	787 248	119,5	76,5	67,0	33,2	33,7	36,3
16 Latvia	2 733,4	1 674,9	1 739,3	88 517	60 154	56 275	30,9	27,8	30,9	9,5	13,6	11,7
17 Lithuania	3 408,4	1 742,0	2 370,5	124 886	89 997	94 257	27,3	19,4	25,1	8,2	11,2	13,4
18 Luxembourg	2 489,2	2 783,6	3 364,4	39 383	40 530	43 197	63,2	68,7	77,9	47,3	50,3	60,0
19 Malta	423,0	390,5	622,0	7 438	7 221	7 669	56,9	54,1	81,1	25,7	26,4	N/A
20 Netherlands	44 900,9	28 678,8	42 048,7	395 983	325 966	297 216	113,4	88,0	141,5	54,1	53,4	61,8
21 Poland	30 539,3	23 965,9	28 289,0	671 338	590 769	608 919	45,5	40,6	46,5	14,9	18,7	15,0
22 Portugal	18 019,9	8 125,8	9 175,8	444 083	259 106	255 506	40,6	31,4	35,9	19,2	17,3	17,3
23 Romania	12 401,6	6 902,0	8 291,1	554 399	369 343	360 058	22,4	18,7	23,0	11,7	15,4	11,3
24 Slovakia	3 034,7	2 002,8	3 658,0	83 645	68 260	73 844	36,3	29,3	49,5	14,0	10,6	12,7
25 Slovenia	3 117,0	1 285,9	1 205,0	76 566	49 002	49 154	40,7	26,2	24,5	17,7	18,9	20,5
26 Spain	219 442,0	45 379,1	57 663,8	1 796 717	722 895	802 548	122,1	62,8	71,9	38,0	32,4	33,7
27 Sweden	19 629,8	23 196,7	32 000,8	256 109	291 179	325 160	76,6	79,7	98,4	48,9	56,2	57,0
28 United Kingdom	113 021,8	94 123,3	124 263,6	1 311 295	1 185 171	1 305 968	86,2	79,4	95,2	57,1	70,2	80,2

EU28 total data for 2010 data provided for 27 EU countries

<https://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tin00152&language=en>

Content analysis

#	Text	internal factors	external factors	dual factors	Source of literature
1	The need to adopt a strategic perspective to business operations has been recognized in other industries of the economy for over four decades. More recently, frameworks and priorities have shifted to a greater extent from the short-term and tactical to the long-term and strategic (Betts, 1999). However, this shift is relatively slow in the construction industry when compared with other ones.	short-term planning long term strategy			"Strategic planning practices of contractor firms in Turkey" - Pinar Irlayici Cakmaka*, Elcin Tasb, 2012, Procedia - Social and Behavioral Sciences 58 (2012) 40 – 46
2	"Strategy is the direction and scope of an organization over the long-term: which achieves advantage for the organization through its configuration of resources within a challenging environment , to meet the needs of markets and to fulfill stakeholder expectations ". Therefore, strategy needs to focus on how an organization competes, how to position itself in the industry and how to turn its strengths to a strategic advantage .	configuration of resources strategy (long -term)	challenging environment	stakeholders expectations	
3	It is found that all construction enterprises would ultimately have to consider strategic concepts to be able to operate effectively in the emerging industry context.	Strategy	emerging industry		
4	According to the table, 64% of small scaled, 80% of medium scaled and 96% of large scaled firms indicated that they have a written statement of mission and vision. On the other hand, 36% of small scaled, 20% of medium scaled and 4% of large scaled firms stated that they do not have a written statement of mission and vision. As it is seen, the percentage of the presence of mission and vision statement increased in large scale firms. This shows that the presence of mission and vision statement changes according to the firm scale. In other words, there is a positive relationship between them.	mission and vision			
5	These firms are the dominant and most experienced ones that operating in the construction industry regarding their operating periods. Furthermore, as they are operating not only in domestic but also internationally , they are holding the largest market share in the Turkish construction industry. With the help of the field survey, the review for the current strategic planning usage in Turkish contractor firms has been put forward. It is observed that contractor firms have mostly been aware of the concept of strategy and strategic planning .	strategy	domestic and international operations		
6	The second part of the questionnaire involves questions about the strategic perspectives of the firms. In this context, several questions are asked concerning strategic planning and its key components such as mission, vision, goals and objectives .	strategic planning goals			
7	Surveyed firms are asked to determine whether they have a written statement of mission and vision in order to reach their set of goals and objectives . It is also searched whether there is a relationship between the firm scale and the presence of mission and vision statement. The results are shown with a cross tabulation in Table 1.	statement of mission and vision goals and objectives			
8	According to the field survey results, it is observed that contractor firms have a general tendency to short-term planning rather than long-term. Their strategic plans generally cover periods of up to five years. They have difficulties making their strategic plans for long-term periods. They do not consider long-term planning necessary since future expectations are decreasing. The common reason of this is the economic and political instability in Turkey .	short-term planning (planning)	economical and political instability		
9	Globalized competition and customer needs forced construction companies to measure their performance beyond the financial measures such as profitability, turnover , etc. As qualitative determinants were added to measurement systems, their investigation and evaluation became a major area of research. In this study, the impact of " resources and capabilities ," " strategic decisions ," " project management competencies ," and " strength of relationships with other parties " on "company performance" was investigated	turnover profitability financial measure resources and capabilities strategic decisions project management competences	Globalized competition Customer needs	relationship with other parties	"Impact of Resources and Strategies on Construction Company Performance", Zeynep Isik; David Arditi; Irem Dikmen; and M. Talat Birgonul. Journal of Management in Engineering, Vol. 26, No. 1, January 1, 2010, pp 9-18
10	Financial resources indicate a company's strength in the market in terms of its capacity to carry out projects.	financial resources			
11	Technical competency concerns the extent of technical know-how available in the company that is necessary to undertake specific projects and the number and type of machinery and equipment owned by the company that are necessary for the physical realization of construction projects	technical competency number and type of owned equipment			
12	Experience is highly related to a company's knowledge management competency. Organizational learning can be effective only if the lessons learned from completed projects are kept in the organizational memory and used in future projects	experience organizational memory			
13	The image of the company compared with its competitors is important. As in all market-oriented industries, contractors also need to portray an image that fits the needs of the market and the clients targeted.			image of the company	

14	Research and development capability is a response to in- creased industry requirements that occurred as a result of globalization and competition between the companies. Developments occur in all phases of the construction process and technologies emerge which are deemed to have a positive impact on competitive advantage	research and development technology	globalization		
15	Innovation capability indicates a company's external orientation to the increasingly dynamic environment of the industry	innovation capability	dynamic environment		
16	Each construction project is unique but the managerial process is normally uniform across projects in a company . As the project is at the core of the construction business, project management competencies cannot be dissociated from overall company performance.	uniform managerial processes project management competence			
17	Schedule management is the competency of reasoning backward since, in the execution of all projects, there is a target date to finish and deliver the job . The success of a project is dependent on project planners that are experienced enough to make estimates of several parameters that may be the cause of a potential delay and to complete the project on or ahead of schedule. Cost management refers to activities that ensure that the lowest possible overall project cost is achieved, consistent with the owner's investment objectives.	Schedule management finish and deliver the job Cost management investment objectives			
18	Quality management represents solutions in response to the complex and nonstandardizeable nature of construction projects that makes it difficult to manage the quality . Even minor defects may require reconstruction and may impair the facility's operations.	Quality management difficulties to manage			
19	Human resources management is an inevitable dimension of project management since it is people who deliver projects. According to Delaney and Huselid 1996 , there is a positive association between human resources management practices and company performance.	human resources			
20	Risk in a construction project is unavoidable and affects productivity, performance, quality, and budget significantly . However, risk can be transferred, accepted, minimized, or shared	risks productivity quality budgets			
21	Claims management is of particular importance because the construction activity involves a large number of parties, an environment conducive to conflicts. Claims and disputes be- tween construction owners, contractors, and other participants can be avoided by clearly stated contractual terms, early non- adversarial communication, and a good understanding of the causes of claims	Claims management			
22	Knowledge management is essential in accessing information relevant to best practices, lessons learned, historical and schedule data, and any other information necessary to run an efficient project. The need for innovation and improved business performance also requires the effective deployment and utilization of project knowledge	Knowledge management			
23	Health and safety management has a human dimension as accidents during the construction process can result in per- sonal injuries and/or fatalities. Accidents also cause an in- crease in indirect costs such as the cost of insurance, inspection, and conformance to regulations	Health and Safety human dimension Increase of direct costs			
24	The performance of construction companies is influenced by the strength of their relationships with the parties involved in typical construction projects such as public or private clients, regulatory agencies, subcontractors, labor unions, material dealers, surety companies, and financial institutions . The strength of these relationships is related to the mutual satisfaction of the parties, i.e., the realization of the expectations of the parties. The primary relationships that are of more importance than others include relationships with construction owners both public and private, labor unions, and regulatory agencies because of the reasons discussed in the following sections.		regulatory agencies,	labor unions re;ationships with parites involved public and private clients subcontractors, material dealers, surety companies, and financial institutions	
25	Relationships with labor unions concern employment policies and practices and relates to the management of the human resources of the company.	human resources		labor unions	
26	Relationships with the government are governed by the effects of government policies and the implementations of regulatory agencies on the construction industry . The construction industry constitutes a large portion of the economy of a country, forcing governments to accommodate construction companies accordingly. In general terms, bureaucratic obstacles set by regulatory agencies to maintain standards in companies' day-to-day operations (e.g., codes, inspections, approvals, etc.) and companies' difficulties in obtaining preferential financial support are some of the government-induced problems		government regulatory agencies bureacratc obstacles		
27	Relationships with clients concern the traditional rivalry between clients and contractors. Even though the importance of cooperation and trust between clients and contractors has been understood somewhat better Bresnen and Marshall 2000 , a strong relationship between clients and contractors is still dif- ficult to achieve.			clients	
28	Differentiation strategies refer to the differentiation of products or services that provides competitive advantage and allows a company to deal effectively with the threat of new entrants to the market	products/services strategy	threat of new entrants		

29	Investment strategies occur along several dimensions such as capabilities of the company resources , pricing financial decisions , product construction project related factors , and finally research and development	investment strategy company resources pricing financial decisions			
30	Market, project, client, and partner selection strategies are related to the characteristics of construction projects such as the location and complexity of the project, environmental conditions, availability of competent subcontractors, availability of materials, equipment and know-how locally, financial stability of the client, and potential partners that have capabilities that the company does not possess	strategies	environmental conditions availability of materials financial stability of the client	equipment and know-how locally	
31	Not surprisingly, differing perspectives of strategy development and implementation have evolved, centering generally on one's view of the capacity and motives of individuals and organizations (Whittington, 2001)	strategy motives of individuals motives of organizations			"An open framework for corporate strategy in construction", Charles Y.J. Cheah and Michael J. Garvin Engineering, Construction and Architectural Management Volume 11 · Number 3 · 2004 · pp. 176–188
32	analysis of trends of both financial and operational performance data using indicators such as profitability, liquidity, leverage ratios and other quantitative measures spanning between 1997 and 2001.	Profitability Liquidity leverage quantitative measures			
33	Overall, some firms grew successfully along market and geographical dimensions while preserving reasonable profitability postures; others failed miserably and even filed for bankruptcy.	profitability Bankruptcy	markets/geographical dimensions		
34	Operational and financial performance ::Profitability, Revenue conversion, collection period, leverage, decisions	profitability revenue conversion collection period Liquidity leverage			
35	Operational strategy is primarily concerned with execution and implementation – how firms manage their operational processes to convert different inputs into final products and services. These activities might include inbound and outbound logistics, procurement functions, production processes for physical products such as precast components, and procedural functions for service provision. For contractors, these activities are analogous to most project management functions such as material procurement, construction of the physical structure, and management of labor and machinery. Likewise, service firms utilize their expertise and knowledge to assist clients in fulfilling their needs and goals, as in planning, design and engineering functions.	Operational strategy operational processes inbound and outbound logistics procurement functions, production processes for physical products project management functions management of labor management of machinery expertise and knowledge planning design engineering	fulfilling Clients needs and goals		
36	No business venture can operate without the consideration of financial issues. There are two fundamental aspects in financial strategy: investment decisions and financing decisions.	financial issues			
37	For example, a strong balance sheet is one of the primary necessities to continually secure surety bonds for ongoing project procurements. Reliance on insurance for risk transfer is also intrinsically linked to the risk management policy of a firm.	balance sheet surety bonds insurance for risk transfer risk management			
38	Some major construction firms have even extended the realm of financial strategy beyond internal implementation. In effect, these firms offer their knowledge and network relationships in this area as additional services to clients in terms of structuring innovative financial packages, particularly in build-operate-transfer (BOT) projects.	knowledge network relationship additional services build-operate-transfer projects			
39	In essence, HR strategy is more concerned about the aspects of managing human assets of an organization. This often turns out to be a daunting task, which requires due consideration of internal and external issues. Some of these issues are: (1) personnel management (e.g. training programs; job rotation among functions and geographical regions); (2) industrial relations (e.g. employment law; union-management relationship; negotiation tactics and strategy); (3) incentives and compensation policies and systems; and	HR strategy personnel management incentives and compensation	industrial relationship		
40	It is important to realize that a chosen structure is simply the means to achieve the ends of producing something that is valuable to clients. In general, organizational structure can be designed along four major dimensions: functions, product/service markets, geography and clients (Galbraith, 2000).	Organizational structure functions product/service markets	clients	geography	
41	Whereas structure is important in defining individual responsibilities within the workflow process, a congruent culture will ensure that individuals carry out these responsibilities with minimum resistance.....	individual responsibilities resistance of individuals			
42	For example, in the construction value system, some firms include a large number of professionals running operations that are technical in nature.....Thus, interactions among people within different management systems would cultivate unique corporate cultures over time.	professionals corporate culture			

43	Obviously, the complexities of structural and cultural issues extend beyond what have been briefly discussed. For example, such complexities increase exponentially when firms expand their business activities to the international level . In this case, phases of cultural development have to be planned (Howes and Tah, 2003), and organizational structure has to be redesigned to absorb changes in control and coordination mechanisms (Bartlett and Ghoshal, 1998; Galbraith, 2000). This is especially true given the nature of construction operations that largely demand responsiveness to the local environment .	structural issues cultural issues	international activities local environment		
44	It is subsequently important for firms to identify proper combinations of these building blocks for their success or survival.... Big picture of the external environment , corporate strategy and organization: - Political and regulatory environment - Social and Cultural environment - Economic environment - Industrial environment - Environmental Engineering issues		Political and regulatory environment - Social and Cultural environment - Economic environment - Industrial environment		
45	Large proportion of businesses concentrated in domestic market . Highly diversified in many vertical markets Pursue high risk , high growth ventures in 1990s, such as private financing schemes , offering long-term contracts in real estate development business	high risk financing schemes long term contracts	domestic market		
46	Knowledge management can be defined as the identification, optimisation and active management of intellectual assets to create value, increase productivity, and gain and sustain competitive advantage (Webb, 1998). It involves the capture, consolidation, dissemination and reuse of knowledge within an organisation (Kazi et al. 1999). The formulation of a knowledge management strategy involves an examination of a number of interrelated concepts and factors (Kamara et al. 2000).	knowledge management			Carrillo, P. M., Anumba, C. J., & Kamara, J. M. (2000). Knowledge management strategy for construction: key IT and contextual issues. Proceedings of CIT, 2000, 28-30. "KNOWLEDGE MANAGEMENT STRATEGY FOR CONSTRUCTION: KEY I. T. AND CONTEXTUAL ISSUES", Patricia M. Carrillo, Chimay J. Anumba, John M.
47	In recent times, the UK construction industry has been forced to critically examine its performance. The Latham and Egan Reports (Latham, 1994; Egan, 1998) have both highlighted the plight of the UK construction industry. Client's dissatisfaction, low profitability, and over-capacity are a few of the many ills described. The industry is beset with solving short-term problems. Historically, financial indicators were seen by many as the key performance indicator. However, the signs are that there may be a cultural shift. Senior construction executives are becoming more aware of management principles and the philosophy of a holistic approach to performance through the use of Key Performance Indicators (KPIs) is gaining acceptance.	low profitability financial indicators KPI	Client's dissatisfaction	over -capacity	
48	A strategy for implementing Knowledge Management within an organisation should set out clear goals and how these are to be achieved within a specified timeframe. For a construction organisation there are a number of considerations. For example, which part of the construction process may obtain maximum benefit, which section of the company will be able to benefit most from a KM strategy, how large a problem should be identified, what medium will be used (IT or individuals), how is the system to be evaluated etc.	knowledge management goals			
49	Impact on structure and working practices: The construction industry does not have a strong record of valuing its employees and their individual and collective contributions . This, therefore, makes it more difficult to share knowledge. Tacit knowledge tends to be regarded as personal property rather than organisational property.	Structure valuing employees individual and collective contribution			
50	It is evident from the discussion so far that construction is an industry that needs to better manage its knowledge resources in order to improve business processes and satisfy its clients . However, several IT and contextual issues highlighted in this paper need to be addressed in order to ensure the development of an effective KM strategy.	knowledge resources IT		satisfy clients	
51	The Indian construction industry currently faces the challenges of underdeveloped contractual and legal systems; project management system; quality management systems; and dearth of skilled workforce . The Indian construction process has traditionally been characterised by bureaucracy, red tape and erratically enforced regulations .	project management system quality management systems	contractual and legal systems Bureaucracy erratically enforced regulations.	Skilled workforce. Bureaucracy	"Strategic Change for Growth: A Case of Construction Company in India", Sanjay Bhattacharya, Kirankumar S. Momaya, K. Chandrasekhar Iyer, Global Journal of Flexible Systems Management (December 2012) 13(4):195-205
52	Indian Industry is not geared up to meet the challenges of infrastructure explosion. The local contractors have no sense of time and lack commitment. While the international contractors finish their work on time and with a high quality the same is not true for Indian contractor . The Indian industry is still to absorb the culture of finishing work on time and carry out work in a safe manner.	culture of finishing projects on time quality	local Vs international contractors		

53	The above statement is an indicator of the problems and gaps that Indian construction industry faces vis-à-vis the international counterparts . There is lack of a long term vision for strategic change, competitive advantage, international competitiveness and growth. Absence of organized and focused change efforts, has not allowed development of management and performance standards to become competitive for global acceptance. The contracting workforce is largely informal and untrained, consisting of many small-sized companies with low skill levels .	long term vision for strategic change quality of a workforce	local Vs international contractors		
54	Due to lack of internal capabilities as well as strategizing vision , most companies in India are unable to convert these huge opportunities that the infrastructure expansion projects currently offer into competitiveness	strategy internal capabilities			
55	The Case Company, like most successful and high growth companies also grows due to a strategised change and growth plan . The trend within the company is to chalk out Strategy in blocks of 5 years with objective and quantitative targets . There have been more occasions than one, when these 5 year targets have been excelled and sometimes achieved within a shorter time span of 3 years.	strategy growth plan objective and quantitative targets			
56	The core decision is to make the Case Company a multinational , and in the process also create shareholder value. Earlier, the Case Company was content taking pride on its high quality and difficult projects, but later one of the objectives became to create shareholder value . Intention is to create a blue-chip company. The company got rid of a lot of small businesses—glass, cement and finally, ready-mix concrete.	objectives		shareholder value	
57	As a part of the second plan, the company embarked on a restructuring exercise in an intensive basis. There is a proposal to create 12 operating companies that will be responsible of their own strategic/operational decisions . This decentralization is expected to result in sustained value creation. The verticals are expected to function as independent companies with disciplines like finance, human resources , etc., vested on its board	strategy finance human resources			
58	In next few years the company hopes to grow at a rate between 15 and 25 %. The company's commitment to timely delivery and the ability to take up a very large project financially gives it an edge while taking orders.	commitment to deliver take up a large project financially			
59	The third five-year plan of the company will be executed from 2011 to 2015. The top management of the company however, did not wish to divulge complete details of the process for reasons of confidentiality and propriety. Here the company is expected to have included its strategy in defence, nuclear energy, big-ticket infrastructure projects; areas where it plans to take on global competition. There are plans to go for very large projects (\$1-2 billion), driven by in-house engineering excellence . The need is felt to be international and globally more competitive.	strategy in house engineering	international competitiveness		
60	The Case Company very consciously feels that it is not wise to restrict its operations to the domestic level. On the contrary, it is already competing and operating on projects outside India also	going abroad			
61	The Case Company also perceives no difference in operations in developed versus developing nations. It does operate in the developed world of United States, Canada, United Kingdom, France and Australia.		difference in operations in developed versus developing nations		
62	At the international level, safety, quality and project management skills become prerequisites to technical qualification (prequalification). After crossing this hurdle, only the price offers are evaluated. The company did not have to strive separately to achieve these prerequisites, as these were inherently ingrained within the organisation as it grew over the years. Hence, when the ISO systems were adopted, it was not much of a challenge and did not require any disruptive change	safety quality management project management skills ISO system			
63	Growth targets are internally publicized to the employees, as it believed that human resources remain the single largest important factor that can limit and determine the extent contributing to strategic changes for growth. The training requirements of the employees are structured in house, need based and based on annual performance evaluation. Training and development department is oriented towards developing technical, behavioural and managerial skills with a focus on productivity, empowerment and technical advancements .	human resources development of technical, behavioural and managerial skills			

64	Each of the 12 operating companies has a chief executive, and their own board. For a small project of, say, Rs 150-200 crore, the chief executive and his board are free to take their decisions. Beyond Rs 500 crore, a central financial officer and the chief risk officer together review the risk. When the job size goes up to Rs 1,000 crore, the president of the division and the group CFO form the committee to assess the risk. Jobs beyond Rs 1,000 crore, require Chairman's involvement. Currently more than half of the projects the company is bidding for are Rs, 1,000 crore plus value. Risk management being institutionalized has resulted in the margins going up from 4 to 12 % in a span of 7-8 years	levels of decision making risk management			
65	Shortage of skilled personnel is the crucial limitation. As a remedial measure the company resorts to outsourcing, while continually looking for new ways to enhance its in-house capabilities. The company maintains a lot of flexibility in its outlook and is ready to adapt based on the circumstances and context of a project. Low compensation is an issue, but expectedly does not hold back efforts on part of an employee.	skilled personnel Low compensation			
66	So some of the prominent conclusions that can be highlighted from the study of the Case Company are as follows <ul style="list-style-type: none"> • Companies require a strong and decisive professional leadership to impart direction and momentum to changes • Companies need to set an objective and time bound road map for growth • There is a need to align with the international benchmarks and excellence in operations to compete successfully across various markets • There is a need to develop a capable human resources and skills as per the customer needs; • There is a need to have presence across all project portfolio irrespective of attractiveness; This evolves from an understanding that a larger pool of business enhances growth possibilities 	professional leadership road map for growth human resources presence in different projects	various markets		
67	There is a need to operate in different geographical regions and markets to mitigate the adverse effects of economic cycles; the operations in international markets have to be built consequent to the success in domestic markets Suitable organisation structure is a process of continual evolution on basis of market trends and preferences of the customer The firm has a long way to go to enter and sustain position in the world in top ten, not only by size, but by business excellence.	structure of organization	different regions economic cycles		
68	The business environment today is forcing the companies to focus their efforts onto gaining more clients and increasing the overall level of efficiency and performance. Thus, the quest to identify sustainable competitive advantages has become more important than ever before.	efficiency performance	business environment		Vele Cristian - Liviu, 2013. "Organizational Culture And Strategy. How Does It Work? An Empirical Research," Annals of Faculty of Economics, University of Oradea, Faculty of Economics, vol. 1(1), pages
69	Due to the fact that organizational culture sets the behavior of employees, motivating them to achieve the company's strategic goals, it influences the effectiveness of the strategy formulation and implementation process. In order for the new strategy to gain sustainable competitive advantages, it must be implemented in an efficient manner and it has to be supported by all the members of the organization.	behavior of employees strategic goals			
70	Choosing the right strategy represents one of the key elements in strategic management, companies focusing solely on their own future and the means to cope with the numerous external influences and pressures. Also, it is very important for the new strategies to lead to sustainable competitive advantages. In order to achieve this, they have to be realistic in evaluating the external influences and, also, the internal capabilities and core competencies	right strategy	external influences		
71	However, companies can increase their performance by creating strategic alliances with other companies, in order to combine the efforts and to create innovative products and services, and also to gain competitive advantages.			strategic alliances with other companies	
72	This may cause employees to oppose the new strategy, as they try to maintain things unchanged in their working environment. It is very important, in ensuring the success of the strategic process, for managers to adopt a high level of transparency and to communicate very efficiently the benefits of the new strategy, in order to show that it will influence, in a positive manner, the organisation and its members. Also, it is important that managers create a dynamic organizational culture.	transparency communication strategy			
73	As a service business, we're only as good as the people providing the service. If we don't invest in developing the people who do that work, we won't stay viable. For us, developing talent is an investment, not just of money but of time and effort.	development of people			"Building for the future" BRETT HITT, CO-PRESIDENT, HITT CONTRACTING, Talent Development, February 2016, pp.32-37
74	As leaders grow and develop, they want more road and so you seek more road. And likewise, as business opportunities grow for the company, you also need the leaders to manage them. It's about matching people's talents with areas of the business that take advantage of the market.	matching people's talents			
75	We've talked about doing a scorecard and we don't have one in place right now, although I think that would be terrific. We measure ourselves pretty strongly on our repeat business. One of the factors for promotion in operations is repeat business.	measuring ourselves (company)			

76	I think that if I can't get my own kids interested, we probably have a problem recruiting Millennials in general. Engaging Millennials has become part of our commitment to talent development. We're about breaking down walls and elevating communication with Millennials. It's absolutely about embracing change, and I think we're moving.	engaging new generations			
77	Recessions occur during the 'down' or contraction phase of the business cycle and according to Claessens et al. (2009), they begin just after the economy reaches a peak of activity and end as the economy reaches its trough. Both the Irish and UK construction industries have seen a dramatic change since the onslaught of the global economic recession in 2007.		recessions of the industry global economic recession		"Linking response strategies adopted by construction firms during the 2007 economic recession to Porter's generic strategies", PAUL TANSEY, JOHN P. SPILLANE and XIANHAI MENG Construction Management and Economics, 2014 Vol. 32, Nos. 7-8, 705-724,
78	Response strategies such as freezing salaries, cutting bonuses, employing staff on a project-by-project basis , training staff for ways to reduce costs, and increasing staff working hours were implemented across the company. Financially, the firm had to make amendments both internally within the company and externally with regard to financial institutions.	cutting remuneration increasing working hours costs reduction			
79	The company has differentiated itself from its competitors by building on its marketing capabilities. In particular, the firm put huge emphasis on its task environment by improving its reputation and relationships with customers , professional consultants, creditors, and contractors. Accordingly, it has built up long-term relationships and formed strategic alliances with insurance companies, professional consultants, and building contractors.	differentiation from competitors reputation		relationship with clients strategic alliances	
80	HR/personnel strategies proved to be the most significant type of cost-cutting response strategy adopted by the company during the recession. Implementation of response strategies such as up-skilling and retraining of staff has increased vastly during this period, with every employee having an associated training plan. The company has further reduced costs by freezing salaries for six months, delaying pay rises for one year, cutting bonuses back to 2007 levels, and cutting over-time	HR strategies cost cutting freezing salaries and bonuses			
81	Leading up to the 2007 recession , the firm had no real business plan on what it wanted to achieve and where it wanted to be. Moreover, a lot of the company information was withheld by a small number of senior people, particularly the financial information. During 2008 and 2009, through the appointment of a new CEO, the company saw the need for major strategic change within the business. This strategic change requirement was met through the implementation of a new five-year business plan (2010-15) which enabled the firm to differentiate itself from its competitors on numerous platforms. The company greatly improved the sharing of information internally with its staff, through management conferences and toolbox talks. The firm also increased its emphasis on R&D and new technologies through the appointment of a new innovation manager. Innovations such as a mobile recycling unit were developed in order to improve waste management practices across the business. During the recession period the firm also concentrated on improving its marketing capabilities. With most of its key clients concerned with public image, the firm has worked very hard on improving its public relations and corporate image, and has changed the company brand image as a result.	business plan differentiation from competitors	recession		
82	Throughout the recession period the firm has focused a great deal on marketing and tendering/contract strategies. It has set itself targets by reducing its dependency on water to about 60% of its turnover by 2015, and by increasing turnover growth in the rail and energy sectors.	marketing targets			
83	In 2007, the firm appointed one of its senior staff members as financial director, mainly to improve its overall financial capabilities , but critically to implement stricter financial management across the business. Using its financial capabilities, the company has also increased its tangible asset base by acquiring property while prices were at rock bottom	financial capabilities tangible assets			
84	The firm has worked hard on its reputation and on improving relationships with existing clients. In order to improve its relationship with one client in particular, in 2008, the firm agreed to complete a four-month project, once a year, for a four-year period for the client in the UK.	reputation		relationship with the client	
85	Financially, the firm has had to dispose of some older plant in order to raise cash and has also refinanced some plant in order to help with cash-flow problems on certain projects. Overall, throughout the recession period, the company has increased its tangible assets by the addition of new plant and equipment. In relation to HR/personnel cost-reducing strategies, the firm has reduced wages, bonuses, overtime, and staff perks (transport and fuel).	refinancing selling assets HR			

86	Within the past year, the company has made some significant changes to its website, and has developed a new company brand image which it has put on all its transport, plant, and equipment. This has improved the firm's corporate image and has improved its overall professionalism across its task environment	improve of the corporate image improved professionalism			
87	Based on the economic report 2014/2015 (Ministry of Finance Malaysia, 2015) Construction Sector contributes 4% to GDP and employment 9.1% of the overall workforce in 2015. Even though the statistics presents well enough but in reality construction industry is facing chronic skilled labour shortage on site. It also becomes the greatest challenge facing the Malaysian construction industry.			labour shortage	"Formulating a Long-Term Employment Strategy for Construction Workforce in Malaysia", Norazlin Mat Salleh, Siti Siti Sarah Mat Isa, Syarifah Nur Nazihah Syed Jamalulil, Irma Hanie Ibrahim, Edelin Hussein, MATEC Web of Conferences 66, 00053 IBCC 2016, DOI: 10.1051/mateconf/20166
88	Malaysia offers investors a young, educated and productive workforce at costs competitive with other countries in Asia . Backed by the government's continued support of human resource development in all sectors, the quality of Malaysia's workforce is one of the best in the region.		market offers young educated workforce at competitive price		
89	The detail outline of this research will use exploratory research. For example, it is one thing to describe the employment problem in construction site . It is to develop explanations about why the youth is less interest to choose the career in construction, despite the enrollment of trainee to training center is increasingly but the industry is still dependent on foreign nationals on the grounds that employers' awarded local people do not want to work.		employment problem in construction industry		
90	Project management is aimed at some goal ; therefore, defining the mission and aims of implementation is of primary importance. These are the part of the notion of development strategy of an enterprise. Creating a strategy for big construction holding companies is complicated by the necessity to account for different factors effecting each business- block and subsidiary companies.	goal strategy			Rodionova S.V., Vlasenko V.A."Methodological Bases of the Optimization of Organizational Management Structure at Implementing the Major Construction Enterprise Strategy". Vestnik MGSU [Proceedings of Moscow State University of Civil Engineering]. 2015, no. 9, pp. 158—167. (In Russian)
91	The following organizational change (subject to cutting of managerial expenses) has also several negative factors, related to the increase in transportation expenses, potential manipulation by the subcontractors and resistance by the working personnel .	cutting of managerial expenses working personnel		manipulation by the subcontractors	
92	The business strategy frames what products and on what market (where) they are offered . Construction contractors can either develop a 'fast-cycle' competence in multiple modes of strategy-making or "throw process to the wind" and concentrate on the content of business (Junnonen, 1998). An operations strategy is a long-range plan for the operations function (Anderson et al., 1989). An operations strategy frames how operations should be conducted to support a business strategy	strategy			"Understanding construction contractors and their operations strategies" Helena Lidellöw and Kajsa Simu, Procedia Economics and Finance 21 (2015) 48 – 56
93	The decision category process technology was rarely mentioned in the interviews, which is not surprising because in the construction industry process technology is generally bought-in, i.e. a firm does not invest in the technology itself, thus it is not an important decision category. Capacity was a bigger issue and the comments on it mostly concern arrangement of human resources , not machines, which is essential for every new building project.	technology capacity human resources			
94	Vertical integration was a more important category, but the respondents' comments indicated that it was seen as problematic and difficult to achieve since the contractors cannot control the performance of subcontractors who could, potentially, be involved in such integration. No statements were made indicating that vertical integration was seen as a positive factor or even a possibility to increase quality in operations.	Vertical integration incl subcontractors control			
95	Human resources comprised an important factor , which interacts with capacity as a decision category. All the respondents identified "having the right people" as crucial for success, and indicated that the financial and quality outcome of a project is highly dependent on the competence of the individual chosen as site manager. Several respondents also expressed a belief that retaining good personnel is an important success factor in operations.	human resources			
96	After organization, quality was the second most important decision category. One of the respondents did not touch upon the subject, but the other two repeatedly mentioned quality during the interviews. The main issue with quality is that it strongly depended on the individual or subcontractor responsible for tasks, regardless of their nature (e.g. handiwork or administrative). Consequently, the planning of projects often fails, due to a large variation in quality. Respondent B voiced this experience as a quality concern through stating that a schedule governs virtually everything.	works quality			

97	The following succes factors (for the construction project planning and implementation) were determined: Project related: Setting clear objectives Improving communication Speeding up decision making Handling unforeseen ground conditions Improving project schedules and plans Coping with legal/statutory requirements Effective use of technology Coping with site conditions (within the site) Ensuring monitoring and feedback system Better handling of design complexities Coping with estimation errors	Clear objectives Communication Speeding up decision making unforeseen ground conditions project schedules and plans legal/statutory requirements use of technology site conditions (within the site) monitoring and feedback system design complexities estimation errors			"Analysis of the Influence of a Strategy-led Planning Approach on Successful Construction Project Implementation", James Olabode Bamindele Rotimi and Chamila D D Ramanayaka, Construction Economics and Building, Vol.15 No 2, pp.13-30
98	The following succes factors (for the construction project planning and implementation) were determined: Organization related: Dealing with client's characteristics Improving project financing Ensuring contractor's cash flow Minimizing delays & errors in design documents Improving site management and supervision Getting top management support Improving project finance from client Smoothly working with sub-contractors Developing project organizational structure Getting lower cadres' support	Improving project financing Ensuring contractor's cash flow Improving site management and supervision Getting top management support Developing project organizational structure Getting lower cadres' support	Dealing with client's Improving project finance from client	delays & errors in design working with sub-contractors	
99	The following succes factors (for the construction project planning and implementation) were determined: Resource related: Minimizing material shortages Coping with material changes Deciding on off-site prefabrication Handling labour shortages Coping with low skill levels Handling plant shortages Coping with low efficiency of plants Coping with plant breakdowns Avoiding wrong selections of plants	material shortages material changes off-site prefabrication labour shortages low skill levels plant shortages low efficiency of plants plant breakdowns wrong selections of plants			
100	The following succes factors (for the construction project planning and implementation) were determined: External related: Helping to minimize political issues (such as policy/regulatory changes) Helping to minimize economic issues (example: inflation) Helping to minimize social issues (disturbance to the surrounded community) Helping to minimize weather uncertainties		Political issues Economic issues Social issues weather uncertainties		
101	Sub-strategies (supportive strategies to main strategies) in the 'planning related' category include financial planning , resource balancing and risk management planning at both conceptual and implementation stages	financial planning, risk management			
102	The second most frequently mentioned theme was ' stakeholder management ', with 28% of the strategies in total able to be categorized under this group. Regardless of the type of strategy, their aims were commonly, to share knowledge in order to clarify extremely complex situations related to design and construction methodologies, be mutually advantageous and minimise interruptions between schedules of various stakeholders under dynamic situations. In contrast, the focus of stakeholders was different in the conceptual and implementation stages. While the client was mentioned as the most dominant single stakeholder under conceptual strategies, sub-contractors, contractors' team and suppliers were more dominant stakeholders focused on during the implementation stage.		'stakeholder management		
103	The third and fourth most frequently mentioned themes are ' construction technology ' (16%) and ' design related ' (7%), and can be considered together under value-adding techniques. These value adding techniques seem to be used to decide what should be done, how it should be done, and by which means.	construction technology design related			
104	According to the study findings, construction project managers use different strategies from adding buffers in real practice . Using effective construction methodologies , pragmatic design solutions and distinct calendars between planning and implementation are some the most favourable strategies the NZIOB award recipient mentioned. These strategies could ensure positive improvements towards the critical success factor, which the median central tendency was quantified to be M=8.5 (very high influence). One may argue that the latter option, the use of different calendars for planning and implementation, is also buffering.	buffers in real practice effective construction methodologies pragmatic design solutions distinct calendars between planning and implementation			
105	Started in 2007, the global economic crisis has not left the Polish companies without an impact, including those belonging to the construction sector. In the years 2008-2013, companies in this sector recorded a deterioration of many financial indicators , including, inter alia, decline in the net profit per 1 company, decline in profitability (ROS, ROA, ROE)	fiacial indicators	global economic crisis		"Net Working Capital Management Strategies in the Construction Enterprises Listed on the NewConnect Market", Janina Jędrzejczak-Gas, Procedia Engineering 182 (2017) 306 – 313

106	A significant impact on the maintenance of an appropriate level of liquidity is net working capital (NWC), which consists of current assets and current liabilities. The way to manage NWC depends on the strategy employed in the enterprise.	liquidity			
107	The strategies for managing net working capital can be divided into two sub-strategies [12]: strategy of managing the size of current assets (current assets management strategy), strategy of financing current assets (current liabilities management strategy).	financing assets assets management			
108	Hopes for crisis-free economic development are long gone. Steady development of planned national economy was reflected in reports to the Congresses of the USSR Communist Party and decrees of the Party. After the collapse of the largest public property-based economy in the world, it became clear that it was sink or swim for everyone involved.		crissi-free economy planned national economy		"Hidden reserves of post-crisis development of construction industry", Inessa Lukmanova, Natalia Yaskova, Procedia Engineering 165 (2016) 1293 – 1299
109	This was not to be said about the construction industry, though. In spite of absence of government contracts , suffering from skyrocketing inflation , deficit of investment resources , contradictory legal base , bureaucratization and low contractual discipline , many construction companies managed to survive and accumulate enormous base for development. For example, several construction companies diversified their activities , creating not only project bureaus, enterprises for production of construction materials, repair facilities, real estate agencies, but also property management companies	diversification of the activities	government contracts inflation deficit of investment resources contradictory legal base bureaucratizatio low contractual discipline,		
110	It was after some time that all of the players on the construction market realized they needed to develop economically effective technologies of sustainable development . Speculative instruments like barter trade, shadow schemes, tax exemptions, program benefits and preferences etc. came and went, but sustainable development required a systemic approach and continuity in strategic decisions	economically effective technologies sustainable development.			
111	potential breakdown, or even turnaround, of a development trend . When applied to the construction industry, it means that a construction company can reorient for new segments of the industry (i.e., from high-rise to low-rise construction, or from construction of large hotels to construction of guest apartments) or even transform the complex construction technology (i.e. from panel to monolithic construction, or switch from on-site equipment assembly to production of ready-made blocks (e.g. bathrooms etc.) [3]. Switch from contracting to development activities or from development to share approach to business activities is also possible;	turnaround, of a development trend. reorient for new segments of the industry			
112	complexity of changes, meaning not only changing of types of activities, but their formats. This, undoubtedly, makes more difficult the evaluation of time and amount of resources needed for the new trends to form as well as their influence on and shares in the dynamically changing environment . Impossibility of correct prediction necessitates the formation of options of trends of possible changes and combinations of changes;	resources	changing environment		
113	These studies showed that, irrespective of a level of development of investment and construction industry in any country, influence of administrative resources is expressed in establishment of investment burdens , setting strict amount of time needed for procurement of necessary permits, amount and nature of agreements, quality of support measures etc. Therefore, in today's context, influence of administrative resources on development trends cannot be ignored, especially during the development of strategies;		administrative resources investment burdens		
114we intend on putting together a classification of conditions needed for sustainable development of Russian industrial companies conducting their business activities in a changing environment. To do that, we need to single out several important components of construction activities. These are: objective component that allows determination of internal and external space for development of a construction company; partnership component that reveals the features of interactions with project developers, suppliers, contractors etc.;; process component that allows formation and structuring of construction activities; investment component that involves mechanisms of retrieving, application and assessment of investment resources; informational and methodological component that involves methods of protection of construction objects; assessment component that involves standard of assessment of construction activities; prompt response component that allows quick correction of development strategy.	process component investment component information and methodological component assesment component prompt response component	partnership component	internal and external space for development	
115	Studies have shown that the technologies that stabilize investment and construction activities can be divided into: target technologies, which allow for synchronization of targets of different levels ; resource technologies, which allow for economic efficiency of resource circulation .	synchronization of targets of different levels resource circulation			
116	Labor , another essential prerequisite of implementation of investment and construction processes. Qualifications and skills of workforce determine the overall efficiency of investment and construction activities. Crises lead to termination of activities of enterprises and free up labor resources as a foundation of replacement technologies;	Labor Qualifications and skills of workforce			

117	<p>Financial resources that supply all sum of investment processes in the developed market environment. Optimization of turnover, combination of different types of resources, use of scoring borrowing technologies and rollover mechanisms of successive financing [13] become essential features of any investment or construction activity and provide a foundation of financial replacement sustainable development technologies;</p>	Financial resources			
118	<p>For instance, in Kazakhstan, global economic crisis led to more than doubling of volume of incomplete construction projects (from 22.5 billion USD in 2006 to 50.7 USD in 2015; 2.6 times more if measured in the national currency). Construction markets of Russia and Belarus suffer from a similar problem which is further exacerbated by the fact that the share of unsold real estate in commissioned residential housing is constantly increasing and ranges from 10% in Czech Republic to 17% in Belarus. As far as Russia is concerned, average time of sales of residential housing in 2016 exceeded 8 months, which is 1.3 times more than the same index in 2015.</p>		global crisis		
119	<p>Economically efficient completion of such projects based on sustainable development technologies, which are still a hidden reserve of development, will not only allow decrease the costs of construction companies but also free their budgets from financial burdens linked with finishing or liquidation of incomplete construction objects.</p>	sustainable development technologies			
120	<p>A moment comes in the work of every company when it begins to examine the possibility of conquering new markets. Motives for the internationalisation of business operations can differ. According to Kotler (1999), they include: the possibility of increasing sales, greater resource accessibility, securing several markets for products sale and resource acquisition.</p>		conquering new markets		"International Marketing Strategies for Croatian Construction Companies", Lana Lovren i Butkovic, Dražen Boškovic, Mariza Katavi, Procedia - Social and Behavioral Sciences 119 (2014) 503 – 509
121	<p>David Crosthwaite focused on the process of construction company internationalisation, especially in Great Britain. In his paper Crosthwaite (1998) showed the results of empirical research into the internationalisation of British construction companies between 1990 and 1996, with emphasis on the geographical characteristics of these companies' foreign business activities. He showed that most companies preferred to seek opportunities on developed markets as opposed to developing markets because of the secure environment and low level of corruption on mature markets. In 1996 Ofori developed a conceptual model proposing how international and local construction companies, together with the state administration, may achieve common benefits in various stages of the development of construction activities in particular countries.</p>		construction company internationalisation secure environment low level of corruption on mature markets		
122	<p>The basic characteristic of construction operations is that they are project oriented, and construction companies make a go/no-go decision on the internationalisation of activities on a particular project on a targeted new market (Han and Diekmann, 2001). Once the company management has taken the key decision to enter a foreign market, it faces an even greater problem. This is the choice of the optimal international project management strategy.</p>			optimal international project management strategy.	
123	<p>Accelerating globalisation and technological changes place great obstacles before companies that want to survive in the competitive world, and this is especially so in the construction industry. It is difficult to face the challenges of today's international construction system unless companies are more agile, adaptable and effective</p>	unless companies are more agile, adaptable and effective	Accelerating globalisation technological changes		
124	<p>However, it was Chen (2005) who focused most on the choice of strategy for entering international construction markets. On the grounds of a case study of 94 construction companies on the international construction market, he divided strategies in two basic groups: permanent and temporary, and within these two groups he classed seven strategies characteristic of construction companies. These are: joint venture project, solo venture project and BOT (Build-Operate-Transfer) as temporary strategies, and representative office, branch office, joint venture company and solo venture company as permanent strategies.</p>	permanent and temporary strategies			
125	<p>Construction activities have always been closely connected with the social and economic activities of every country. Thus it was one of the stronger moving forces of economic growth in past years in the Republic of Croatia, in the former countries of Eastern Europe, the former Soviet Union and in lands of the Middle East. Until the late 1980s, Croatian construction companies participated successfully both on the domestic and on foreign markets, especially in the Middle East, but after Croatia gained independence its construction companies are unfortunately no longer accomplishing significant business results on foreign markets.</p>		social and economic activities		
126	<p>Croatian construction companies have enough knowledge and experience to carry out the most demanding export projects on foreign markets.</p>	knowledge and experience			
127	<p>A lot has been said about the construction industry and project management in construction. Their specific features and influence on entire national economies are indubitable. The complexity of the construction market, and satisfying the needs and desires of buyers, is a great challenge for all the participants in this activity. An additional problem is the global crisis, whose effects are still felt in all the segments of the economy, and especially in Croatian construction, whose growth of many years has been stopped.</p>		global crisis	satisfying clients' needs	

128	However, research carried out in 2009 shows that Croatian construction companies are aware of the need for marketing in the construction industry, and that they would find it easier to enter foreign markets if they used marketing activities	marketing			
129	The basis on which the whole management activities, organizational structures are being built. Every builder in the process of its creation and development is focused on the achievement of certain objectives , and therefore its organizational structure is intentionally and purposefully created and focused on achieving the set objectives. The effectiveness of achieving the organization's objectives, the implementation of its strategy, the interaction of environment are largely determined by the accuracy of building construction management organization structure .	objectives organizational structure			"Rationalization of Strategic Management Principles as a Tool to Improve a Construction Company Services", O.V. Kliuchnikova, O.A. Pobegaylov Procedia Engineering 150 (2016) 2168 – 2172
130	For each there is a construction company is the best and only her inherent organizational structure of production and management. At the same time each individual company has its own specific use of the process equipment, professionalism and personal qualities of the staff , order and tradition between employees vertically and horizontally. From a philosophical point of view, every company is the epitome of a microcosm consisting of a practical implementation of the comprehensive ideas about the nature of the organizational structure , goals , company mission, and its development strategy and positioning in the global market for space products and services.	organizational structure qualities of the staff goals strategy			
131	The authors have introduced a corporate model featuring higher personnel effectiveness and more effective operational control in the conditions of the contemporary urban environment , suffering from instability, high technogenic hazards, and obsolete corporate production facilities [5,6,7]. Basing on international and national experience, the authors have developed a set of steps aimed at increasing the quality of information chain, setup of a consultancy service, personnel advanced training, and more effective personnel management .	information chain personnel training personnel management.	urban environment setup of a consultancy service		
132	Bureaucracy , currently, although one of the most common in the world, however, undergoes considerable criticism. Among its disadvantages include, first of all, little flexibility and mobility of the structure in the area of operational decision making, respond to changing environmental conditions, primarily the market. Tight regulation of the activities of the staff of special regulations affect the quality of work within the company and with customers, has an impact on systemic thinking responsible managers in general. The inertia of the relationship , the low level of the passage of the need for urgent action signal patterns and automatism of all parts of the structure leads to a loss of initiative, loss of time and loss of considerable freedom of action, which is fraught with financial and	Bureaucracy flexibility and mobility regulation of the staff inertia of the relationship			
133	In any case, the only effective way to respond adequately to changing economic conditions remain constant monitoring of the organizational structure and its modernization in conditions of a going concern, ie Additional risks and losses.	organizational structure modernization	changing economic conditions		
134	Current valuation of the company is the question of its behaviour during the national economic periods . To complement a nowadays survey of development in the stated issue it is necessary to get the survey of the frequency of commercial construction companies acting in the certain market segments, especially in the construction industry. Substantial volume of investments is realised through construction industry and it is clear that any fluctuations in the volume of investments have significant influence on the value of commercial construction companies while number of them is also forced to end their activity.		national economic periods	volume of investments	"Determination of the Lifespan of Construction Company with Respect to its Market Value (CR 1991-2014)", Bohumil Puchýř, Liudmyla Solodilova, Procedia Computer Science 64 (2015) 787 – 791
135	Influence of the financial crisis and development of the demand according to the classification of the economic activities in the construction company is described in the presented documentation. Inconsiderable question to which the answer is currently looked for is the situation of employment in the Czech Republic where there is necessary to point out that the construction industry has the highest absorption ability from the whole national economy		financial crisis employment		
136	Globalization, increasing complexity, dynamic markets, technical and ecological changes are the most frequent trends of the past few years. They reveal the background of the social paradigms shift and bring new visionary ideas about the future direction of the contemporary society and modern organizations [1]. For the companies it is necessary to be able to respond to these changing conditions.		Globalization, increasing complexity dynamic markets technical changes, ecological changes		Klara Antlova, "Agile approach in the project management of the Czech companies", Procedia Technology 16 (2014) 929 – 933
137	If we search in the literature (see table 1) the consequences of the failure of individual projects can be split according to the following four factors. Organizational factors Human factors Business processes Technology	Organizational factors Human factors Business processes Technology			

138	<p>Competition among companies in the construction business is growth. It is characterized by the increasing requirements of the customers desired, limited resources, environmental stewardship and increasing competition [1]. Now, construction companies must have ability to compete and create new business opportunities [2]. Competition between construction companies is more increasing. So, every company is expected have ability to improve the efficiency and effectiveness so that success can be achieved. For long term success, all of construction companies depend on the performance improvements made by absorbing and applying new sciences continuously [3]. It is reinforced by [4] which states that success in business, including the construction business, is highly depend on the quality of human resources.</p>	<p>human resources efficiency and effectiveness</p>	<p>Competition requirements of the customers limited resources environmental stewardship</p>	<p>Mochamad Agung Wibowoa, Rudi Waluyo, "Knowledge management maturity in construction companies", Procedia Engineering, 2015, vol 125, pp. 89 – 94</p>
139	<p>Knowledge management is an organization way to manage knowledge, create values and improve competitive advantage or firm performance [12]. Knowledge management have activities and we can call it knowledge management processes, i.e. knowledge creation, knowledge sharing, knowledge acquisition, knowledge documentation, knowledge application, knowledge transfer, responsiveness to knowledge, and knowledge dissemination</p>	<p>Knowledge management</p>		
140	<p>Thus the concept of maturity can be used for defining the state of effectiveness of an organization or the state of its capability and competency in managing the processes, programs or projects effectively. While maturing, the performance of an organization is becoming better, and an organization is becoming more productive and effective, more competitive and profitable. In the case of knowledge management, the maturity might refer to the state of organization's effectiveness at managing and leveraging its knowledge assets through performing the effective knowledge management processes</p>	<p>managing the processes productivity and effectiveness profitability leveraging knowledge</p>		
141	<p>A significant positive relationship between organizational external factors and construction risk management was asserted. This study also found a significant positive relationship between rules and regulations and construction risk management. As anticipated, rules and regulations were found to moderate the relationship between organizational external factors and construction risk management, with a significant positive result. Similarly, a significant interaction effect was also found between rules and regulations and organizational external factors.</p>	<p>construction risk</p>	<p>organizational external factors</p>	<p>The Influence of Organizational External Factors on Construction Risk Management among Nigerian Construction Companies A.Q. Adeleke ,A.Y. Bahaudin , A.M. Kamaruddeen , J.A. Bamgbade , Maruf Gbadebo Salimon , Muhammad Waris Ali Khan , Shahryar Sorooshian, Safety and Health at Work 9 (2018) 115e124</p>
142	<p>Political, economy, and technology factors helped the construction companies to reduce the chance of risk occurrence during the construction activities. Rules and regulations also helped to lessen the rate of accidents involving construction workers as well as the duration of the projects. Similarly, the influence of the organizational external factors with rules and regulations on construction risk management has proven that most of the construction companies that implement the aforementioned factors have the chance to deliver their projects within the stipulated time, cost, and qualities, which can be used as a yardstick to measure a good project</p>	<p>risk occurrence</p>	<p>Political factor economy factor technology factor</p>	
143	<p>Table 1 depicts the element that was used to assess construction risk management with five dimensions such as management, material, design, finance, and labor and equipment risks, while organizational external factors were assessed with political, economic, and technology factors, with rules and regulations being the moderator assessed as a one-dimensional construct</p>	<p>management risk material risk design risk finance risk labor and equipment risk</p>	<p>Political factor economy factor technology factor rules and regulations</p>	
144	<p>The analysis results showed that eight factors and 47 explanatory variables were affecting the productivity of the construction project implementation in Sungai Penuh City. They include: Human factor Motivation factor Technical factor Safety factor Material and equipment factor Management factor Control factor Time factor</p>	<p>Human factor Motivation factor Technical factor Safety factor Material and equipment factor Management factor Control factor Time factor</p>		<p>Bahrul Anif , Zuherna Mizwar, Riasiska Sari , and Zaitul"Construction projects productivity in Indonesia", American Research Journal of Business and Management, Volume 7, Issue No. 1, 2021, pp. 1-9.</p>
145	<p>The research has identified 43 factors that are classified into 8 groups affecting the labour productivity of construction workers on site in Hanoi. According to the research results (Table 10) there is a following ranking of group factors: 1. The construction workers themselves 2. Motivating for construction workers 3. Working tools and objects of labour 4. Organization and management production on site 5. Labour safety 6. Working time 7. Working conditions 8 Natural environment and society</p>	<p>The construction workers themselves Motivating for construction workers Working tools and objects of labour Organization and management production on site Labour safety Working time Working conditions</p>	<p>Natural environment and society</p>	<p>Nguyen Van Tama, Nguyen Lien Huonga, Nguyen Bao Ngoca, "Factors affecting labour productivity of construction worker on construction site:a case of Hanoi", Journal of Science and Technology in Civil Engineering NUCE 2018. vol 12, No 5, pp. 127–138</p>

146	The conduction of interviews had provided some more delaying factors to be examined in the distributed survey; which, has shown that a critical problem faces the current industry in Kuwait, which is the lack of project management proficiency . This factor affects the construction industry in Kuwait on local and international levels, as it might prevent projects from being completed and affect international contractors' capability to establish proper communication plans with their local markets' correspondences. Furthermore, the above pie chart illustrates that the second most affecting factor is the unreliability of the assigned subcontractors , which severely affects the project's ability to make decisions and understand the other parameters of the project rather than the scope and technical knowledge. The rest of the external factors of delay are organized according to their effect on project's delay by the following order; Conflict Between Contractor and Other Contracting Parties, Issuance of Work Permits, Unseasonable Weather Conditions, Client's Financial Issues, Construction Accidents at Site & Price Fluctuations.	lack of project management proficiency Construction Accidents at Site Price Fluctuations.	unreliability of the assigned subcontractors Issuance of Work Permits, Unseasonable Weather Conditions, Client's Financial Issues,	Conflict Between Contractor and Other Contracting Parties,	Ahmed Atif Hussein Hamouda, "External Factors of Delay That Affect the Performance of International Construction Contractors in Kuwait", International Journal of Integrated Engineering, 2020, Vol. 12 No. 8, pp. 8-19.
147	Construction materials planning and management influence site productivity because, as some authors reported, performance of construction works depends on material quality, adaptation, transportation difficulties within site, time and delivery methods. Supplier's timing is one of the elements frequently causing problems to building firms. This situation might happen because material suppliers follow the just in time philosophy, avoiding stock costs and forcing clients to place their orders in advance, prior to the date when material is needed on site. Another important productivity factor is tool and machinery availability and the risk of not having it on site at the precise moment.	Construction materials planning and management	tool and machinery availability	Supplier's timing	Valverde-Gascueña, N, Navarro-Astor, E, Fuentes-del-Burgo, J, & Ruiz-Fernandez, J.P. (2011). Factors that Affect the Productivity of Construction Projects in Small and Medium Companies: Analysis of its Impact on Planning. In: Egbu, C. and Lou, E.C.W. (Eds.) Proc 27th Annual ARCOM Conference, 5-7 September 2011, Bristol, UK, Association of Researchers in Construction Management, pp.879-888.
148	That human resources represent one of the more significant productivity factors and that it is uncontrollable is well known	human resources			
149	According to the quantitative analysis, construction productivity factors with stronger influence on site performance are the following: faulty works, equipment unavailability, project changes during execution, materials unavailability, lack of project information and poor workmanship.	faulty works lack of project information poor workmanship.		during execution equipment unavailability Materials unavailability	
150	In relation to the factors with lower influence on site performance these are: overcrowded work areas, crew interference, lack of on-site cleanliness, inspection delays and poor materials quality.	overcrowded work areas crew interference lack of on-site cleanliness inspection delays		poor materials quality.	
151	The relationship between the margin and owned part of work can quickly make the object of erroneous predictions. Indeed one might think that: • The higher the owned share, the more the company reduces intermediaries and so the costs. • The larger the sub-treated part, the more the project is done in playing with the competition between subcontractors , and the cost is reduced. After analyzing the construction project samples, whatever the types of projects considered, there is no apparent correlation between the owned shared part and the margin net.	owned part of the works playing with the competition between subcontractors			Zakaria Dakhli, Yassine Bouabdallaoui Zoubeir Lafhaj "Towards the net margin prediction of building construction projects", Oct.-2018 International Journal of Advances in Mechanical and Civil Engineering, ISSN: 2394-2827, Volume-5, Issue-5, pp. 5-9.
152	With regard to takt-time, for example, although, in the context of building construction, deadlines are highly valued, production at the construction site is not usually influenced by changes in market demand. Projects have a contractual deadline supported by a schedule that specifies the duration of the main processes . Thus, each process will take up a specific takt-time , the calculation of which consists of the ratio between the production time available for the process and the number of repetitive units of the process (eg. floors, apartments.)	processes will take up a specific takt-time			W. Fazinga, F. Saffaro, E. Isatto, E. Lantelme, "Implementation of standard work in the construction industry", 2019, Revista Ingeniería de Construcción RIC Vol. 34, No 3, pp. 288-298.
153	Based on these singularities a set of four rules could be proposed to guide Standard Works implementation in the construction industry, mainly considering processes with similar characteristics of the reinforced concrete structure observed in this research. -takt time -work sequence -work in process -transporting and storing resources	processes with similar characteristics			
154	Labour productivity indicates how much output is generated per work hour; it will increase by producing more with the same number of hours worked . Traditionally, production in construction is primarily dependent on human effort and performance .	human effort human performance. number of hours worked			Van Dijkhuizen, M.J., Vrijhoef, R., and Bakker, H.L.M. (2021). "A conceptual model to determine the impact of off-site construction on labour productivity." Proc. 29th Annual Conference of the International Group for Lean Construction (IGLC29), Alarcon, L.F. and González, V.A. (eds.), Lima, Peru, pp. 945-954,
155	Therefore, Construction Labour Productivity (CLP) has a significant effect on project expenses and can influence the profitability of construction firms.	Construction Labour Productivity			

156	<p>The factors and sub-factors affecting labour productivity within the four primary groups and the construction process:</p> <p>primary group External factors Factors: Clients (On-time payment, quality demand, trust), Site characteristics (Limited working space, restricted access) and Surroundings (Government regulations, weather, insecurity, power & water supply)</p> <p>primary group: Management factors Factors: Ability of management (Communication, competence, motivation, presence), Crew management (Incentives, work time policy, crew composition, treatment), Design & engineering management (Change orders, quality of design & engineering, time needed for design & engineering), Financial management (Financing possibilities, liquidity), Health & safety management (Safety measures, working climate), Construction coordination (Research & development, facilitation, schedule change, contract type, timely interventions); Supply chain management and logistics (Quality of transportation, storage, distribution) Tool & equipment management (Maintenance policy, substitution</p>	<p>Ability of management Crew management Design & engineering management Financial management Health & safety management Construction coordination Tool & equipment management</p>	<p>Clients Site characteristics Surroundings</p>	<p>Supply chain management and logistics</p>	
157	<p>Primary group: Labour factors Factors: Behaviour (Absenteeism, effort, turnover), Characteristics & traits (Age, crew availability, crew size, fatigue, health, intelligence, values, personal circumstances, learning speed, confidence, integrity, loyalty), Motivation (Satisfaction, distraction, sense of pride), Skills (Flexibility, preparedness, communication, reaction time, resourcefulness, efficiency, experience, literacy, management skills), Primary group: Material & equipment factors Factors: Materials (Availability, congestion, quality of materials, sabotage, capacity of manufacturing industry), Tools & equipment (Availability, quality of tools & equipment, site lay-out) Construction process Method, overcrowding, quality of work, quantity of work, rework, schedule pressure, waiting time</p>	<p>Behaviour Characteristics & traits Motivation Skills Construction process</p>		<p>Materials Tools & equipment</p>	
158	<p>This paper conceptualized construction risk management with five (5) dimensions which are management risk, material risk, financial risk, design risk, labour and equipment risk...</p>	<p>management risk financial risk design risk</p>		<p>material risk labour and equipment risk</p>	<p>A .Q. Adeleke, A.Y. Bahaudin, A. M. Kamaruddeen , J.A. Bamgbade, Muhammad Waris Ali Khan, Sitansu Panda, Yakibi Ayodele Afolabi"An Empirical Analysis of Organizational External Factors on Construction Risk Management", International Journal of Supply Chain Management, 2019, Vol. 8, No. 1, pp. 932-940.</p>
159	<p>Researches affirmed that majority of the previous studies show that management of risk in construction projects is full of restrictions affecting their effectiveness, and on the long run, impact projects' success. Management of risk in construction projects has been approached with the use of a reductionist method for over decades which has produced poor results and decreased the quality of project management</p>	<p>management of risk in construction</p>			
160	<p>A suitable and proper construction technology can be measured by the presence of plant and equipment that are made locally, the magnitude of local material resources and the level of utilization of the local construction resources, and the skilled labour [34]. The shortage of managerial man-power and inadequate technological know-how were conceived to be some of the major problems confronting the nation.</p>	<p>skilled labour</p>	<p>presence of plant and equipment</p>	<p>construction technology local material resources</p>	
161	<p>The influence of environmental variables such as safety, community perception, and legal acceptability, political and social impacts on the project is mostly high. The author further highlighted discriminatory legislative, covering tax regimes, riots, strikes, civil unrest, wars, terrorism, invasions and religious turmoil as derivatives of political factors. Construction project encounters political forces which refer to the influence of the government policy on the projects.</p>		<p>environmental variables political forces</p>		
162	<p>Construction firm's economy and finances are influenced not only by the global economic activities but also on resource availability to execute the work, which includes the economic competition of several levels around the appointment of all parties involved in building projects. Financial shortage seems to occur on the building project. Obalola's study depicted that financial environment drives are discerned from economic factor on the basis that economic is connected with the deployment of resources, while, the financial shortage is strictly linked with money.</p>	<p>Financial shortage</p>	<p>global economic activities resource availability economic factor</p>		
163	<p>Rateb et al. demonstrated that the project process was influenced by the difficulty of contractors in attracting financing. These authors revealed that financial difficulties faced by the contractor, manpower shortages (of skilled, semi-skilled, or unskilled labour), and excessive changes to the orders by owners were the leading factors directly affecting contractor performance on construction projects</p>	<p>manpower shortages financing</p>	<p>excessive changes to the orders by owners</p>		<p>B.F. Bitamba & S.H. An, "Study on factors affecting the performance of construction projects in the Democratic Republic of the Congo", May 2020, South African Journal of Industrial Engineering, Vol 31, No 1, pp 12-25</p>
164	<p>The findings of this study revealed that design changes cause rework, while rework is the main cause of delays and disruptions in a project due to the loss of productivity.</p>			<p>design changes</p>	

165	The first category is internal factors {affecting performance of construction projects} , which depend on the internal conditions of the project. This means that these factors can be controlled by the construction project manager (PM).These facts are: Design, Scheduling & project. rectification, Client, Cost, Time, Quality, Productivity, Health and safety, Consultant, Contractor, Project management and competence, Labour, equipment, and material	Scheduling & project. Rectification Cost Time Quality Productivity Health and safety Contractor Project management and competence Labour Equipment	Client Consultant	Design	
166	Based on our findings of the study, it can be concluded that the three factors brought out from this study that is the company's strength, project risk, and competition , are the significant determinants or factors that affect small scale indigenous contractors' decision to bid for construction projects in Awka, Anambra State in Nigeria.	company's strength	competition	project risk	Chidiebube Emmanuel Obodo, Zhenan Xie, Benjamin Blandful Cobbinah, Kate Dazagbyilo Yakubu Yari"Evaluating the Factors Affecting Contractors Tender for Project Construction: An Empirical Study of Small Scale Indigenous Contractors in Awka, Nigeria", 2021, Open Journal of Social Sciences, Vol. 9, pp. 381-397.
167	Improving and measuring the performance of the workflow has been a common subject in studies investigating lean concepts in construction. Kalsaas points out that the workflow is influenced by the configuration of several other flows, materials, information, people, and equipment , as well as the conditions of the context in which the production develops, such as the work location and site characteristics .	materials information people equipment	site location site characteristics		Fazinga, W.R., Saffaro, F.A., Isatto, E.L., and Kremer. A. (2016). "Difficulties in Work Design in the Construction Sector." In: Proc. 24th Ann. Conf. of the Int'l. Group for Lean Construction, Boston, MA, USA, sect.6 pp. 13-22.
168construction companies are among the least performing industries due to its lack of effectiveness and productivity. Sometimes these problems are caused by design errors and lack of specifications. Other sources are design modifications during the construction process, lack of supervision on workers, overcrowding of workers, high labor turnover and poor industrial safety conditions	lack of supervision on workers, overcrowding of workers high labor turnover poor industrial safety conditions		design modifications and errors	Vrijhoef, R. (2016). "Effects of Lean Work Organization and Industrialization on Workflow and Productive Time in Housing Renovation Projects." In: Proc. 24th Ann. Conf. of the Int'l. Group for Lean Construction, Boston, MA, USA, sect.2 pp. 63–72.
169	These influences on labor productivity represent aspects of work organization and could be categorized in three groups : - Industry related factors such as complexity and repetition of design, laws and regulations, job duration, work size and type, weather conditions, site location. - Management related factors such as planning and scheduling, leadership, motivations and communication. - Labor related factors such as labor skill, motivation and labor availability.	Labor related factors Management related factors	Industry related factors		
170	Applications of lean work organisation and industrialization appear to have their effects on workflow and productive time. Although these are advancements in their own right they do not automatically point towards each other nor always combine in construction practice. However in theory both concept of lean and industrialization , and the routes they both suggest towards smoother workflows and reduced productive time, and increased productivity, are often part of the same conceptualisations of either lean construction or industrialized construction .	Lean construction industrialization			
171	Construction is substantially impacted by economic conditions ; when economies are on the rise, people feel more confident, which leads them to spending money easily and they are more inclined to invest in the future. All of this leads to an increase in the demand for new construction. However, when economies are stagnant or in decline, these conditions are reversed. When considering economic conditions, it is important to understand that national economies are interlinked and the global economy shapes many activities		economic conditions		Tamlyn Snyman, John Smallwood, "Improving Productivity in the Business of Construction", 2017, Procedia Engineering No. 182, pp. 651 – 657
172	new construction orders are highly dependent on economic conditions and the expectation that people have with respect to the immediate future. The construction industry has to operate on the basis that there will be fewer certainties in the long term. These economic facts need to be taken into account when deciding strategies for the organisation		economic conditions		
173	There are two primary threats faced by the financial future of construction organisations, namely, lack of profitability and insufficient cash flow. Construction projects are well-known for their high risk and uncertainty , mainly due to the fact that information is very limited at the cost estimate phase of construction projects. Effective cash flow management is vital for any contractor to survive in the competitive construction industry. Studies and investigations have revealed that often failure of construction projects is attributable to a lack of liquidity	liquidity uncertainty, due to the limited information			

174	Though the construction industry has greatly improved in terms of total productivity in last decades with the development of machinery and work equipment more powerful on the one hand, and new construction procedures on the other, it still continues to be a labor-intensive industry where labor costs still remain an important part of the overall project's cost	machinery and equipment construction procedures labor costs			G. ROBLES, A. SUII, JOSE L. POINZ-TIENDA, S. GENTES "Labor Productivity in the Construction Industry -Factors Influencing the Spanish Construction Labor Productivity",2014, International Journal of Civil, Architectural, Structural and Construction Engineering Vol. 8, No. 10, pp. 999-1008.
175	Project Related Factor's Category Clarity of the drawings and project documents Complexity of the design Construction method Project scale	Project Related Factor's Category Clarity of the drawings and project documents Complexity of the design Construction method			
176	Human Related Factor's Category Level of Skill and experience Ability to adapt to changes and new environments Labour motivation Worker's integrity Number of breaks and their duration Working overtime	Human Related Factor's Category Level of Skill and experience Ability to adapt to changes and new environments Labour motivation Worker's integrity Number of breaks and their duration			
177	Management/Organizational Related Factor's Category Clear and daily task assignment Delays in payments to workers Coordination between crews Improper coordination of subcontractors Insufficient supervision of subcontractors Communication problems Inadequate planning Delays in payments to suppliers Unrealistic scheduling High congestion Rework Reallocation of laborers Lack or delay in supervision Incentive policies	Management/Organizational Related Factor's Category Clear and daily task assignment Delays in payments to workers Coordination between crews Improper coordination of subcontractors Insufficient supervision of subcontractors Communication problems Inadequate planning Delays in payments to suppliers Unrealistic scheduling High congestion Rework Reallocation of laborers			
178	Materials and Tools Related Factor's Category Shortage or late supply of materials Tools or equipment shortages Unsuitability of materials storage location	Materials and Tools Related Factor's Category Shortage or late supply of materials Tools or equipment shortages Unsuitability of materials			
179	Environmental Related Factor's Category Motion's limitation in the jobsite High/low temperatures Performing work at night Rain Influence of working at height High winds Distance between construction sites and cities Air humidity		Environmental Related Factor's Category Motion's limitation in the jobsite High/low temperatures Performing work at night Rain Influence of		
180	Many research studies have been conducted to evaluate and improve performance in the construction industry. Traditionally, the industry evaluates its performance using three key indicators; time, cost, and quality	time cost quality			E Soewin, T Chinda,m "Factors affecting construction performance: exploratory factor analysis" 2018, IOP Conference Ser.: Earth and Environmental Science,. 140 012102, doi :10.1088/1755-1315/140/1/012102
181	Ref [3], however, claims that the traditional indicators can no longer be an effective measurement of project success. In real practice, many factors apart from those three key factors affecting construction performance, directly and indirectly. Ref [8] mentions to include safety and health aspect for better construction performance, whereas ref [9] claims the importance of financial aspects for the profitability and survivability of a construction company. Similarly, ref [10] discuss about environmental aspects for better construction performance, the importance of client/ customer satisfaction is pointed out by ref [11]. On the other hand, ref [12] argues that stakeholder management is crucial to improve company performance	safety and health financial aspects	environmental aspects customer satisfaction	stakeholder management	

182	<p>Factors affecting construction productivity</p> <p>Availability of resources, Contractual disputes, Scope clarity of the project, Design capability and frequent design changes, Rework, Coordination between all stakeholders, Project managers authority to take financial decisions and selecting key team members, Timely payment of completed works, Site clearance/availability, Ability to handle the crisis by the pm, Use of inappropriate planning tools and techniques</p> <p>Quality, Leadership qualities, Top management support to pm</p> <p>Human resource and labour strike, Cost, Project coordination meetings</p> <p>Inadequate project formulation in the beginning, Obsolete construction equipment's, methods and technology, Conflict of interest among team members, Customer/client satisfaction, Conflict of interest among team members, Availability of training and development for enhancing of skills</p> <p>Selection of pm with proven track record, Supply chain, Willingness to adopt change, Claim genuineness, Regular budget update, Social skills of key team managers, Working hours, Developing and maintaining a short and informal line of communication, Urgency emphasized by the owner while issuing tender, Ability to delegate authority, political and economic environment, Exceptional difference between client and architect, Interpersonal skills, Climate conditions, Interest and inflation rates, Availability of accurate historical information, Social environment</p>	<p>Availability of resources, ,</p> <p>Scope clarity of the project, Rework, Project managers authority to take financial decisions and selecting key team members, Timely payment of completed works, Ability to handle the crisis by the pm, Use of inappropriate planning tools and techniques, Quality, Leadership qualities, Top management support to pm, Cost, Project coordination meetings, Inadequate project formulation in the beginning, Obsolete construction equipment's, methods and technology, Conflict of interest among team members, Availability of training and development for enhancing of skills, Selection of pm with proven track record, Supply chain,</p>	<p>Site clearance/availability, Customer/client satisfaction</p> <p>Urgency emphasized by the owner while issuing tender, political and economic environment, Exceptional difference between client and architect</p> <p>Climate conditions, Interest and inflation rates, Availability of accurate historical information, Social environment</p>	<p>Contractual disputes, Design capability and frequent design changes, Coordination between all stakeholders</p> <p>Human resource and labour strike,</p>	<p>Saurav Dixit , Satya N Mandal, Joseph V Thanikal and Kinshuk Saurabh, "Study of Significant Factors Affecting Construction Productivity Using Relative Importance Index in Indian Construction Industry", 2019, EECE 2019, E3S Web of Conferences 140, 09010. https://doi.org/10.1051/e3sconf/201914009010</p>
183	<p>In construction, productivity is influenced by people, although the use of technology and machinery have moderating effects on specific projects</p>	<p>people, technology and machinery</p>			<p>Lesiba George Mollo, Fidelis Emuze, and Nicholus Sishuba, "Tension between Productivity and Respect for People in Construction", 2020, MATEC Web of Conferences 312, 05005, pp. 1-7, https://doi.org/10.1051/mateconf/202031205005</p>
184	<p>Productivity in the construction industry refers to making use of production resources, operators that do not waste imports, for example, increasing growth rates while decreasing the use of resources</p> <p>According to Ardit and Mochtar productivity is not only influenced by labour, but also by other factors such as materials, equipment, construction methods, and site management</p>	<p>production resources</p> <p>labour</p> <p>materials</p> <p>equipment</p> <p>construction methods</p> <p>site management</p>			
185	<p>According to Abrey and Smallwood, poor working conditions in the construction industry are part of the problems causing poor quality of work, which lead to the decline of productivity and overall performance at the job site.</p>	<p>poor working conditions</p>			
186	<p>Factors affecting productivity</p> <p>Poor management style, Unrealistic deadline, Designed construction methods, Training and Skill development, Management of material supply, Availability of resources, Distance and location of sites, Language barriers, Accommodation of the workers</p>	<p>Unrealistic deadline, Designed construction methods, Training and Skill development, Management of material supply, Availability of</p>	<p>Distance and location of sites, Language barriers, Accommodation of the workers</p>		
187	<p>In order to identify critical success factors of social housing refurbishment projects, success-related factors for construction projects were taken from a study by Chua et al. They distinguished success factors for construction projects according to the project objectives of budget, schedule, and quality. In their layered model, they presented 67 factors of influence divided into four main project aspects: Project characteristics, contractual arrangements, project participants and interactive processes.</p>	<p>contractual arrangements</p> <p>interactive processes.</p>	<p>project participants</p>	<p>Project characteristics</p>	<p>Vrijhoef, R. and Van Dijkhuizen, M. 2020. "Lean Toolbox Approach for effective Preparation of Housing Refurbishment Projects using Critical Success Factors." In: Tommelein, I.D. and Daniel, E. (eds.). Proc. 28th Annual Conference of the International Group for Lean Construction (IGLC28), Berkeley, California, USA, pp. 181-192.</p>
188	<p>Different notions and experiences of project success were reformulated and restructured into a common set of critical success factors. The following critical factors for project success emerged across the cases:</p> <p>Time availability</p> <p>Project management involvement</p> <p>Project management capabilities</p> <p>Capacities of the project team</p> <p>Authority and expertise of project team members</p> <p>Economic risks</p> <p>Clear goals and expectations</p> <p>Doing inspections and recordings of work</p> <p>Formal and informal communication with residents.</p>	<p>Time availability</p> <p>Project management involvement</p> <p>Project management capabilities</p> <p>Capacities of the project team</p> <p>Authority and expertise of project team members</p> <p>Clear goals and expectations</p> <p>Doing inspections and recordings of work</p>	<p>Economic risks</p> <p>Formal and informal communication with residents.</p>		<p>analysis</p>

Web of Science	Scopus	Manual search
5	24	9
38		

Appendix 8 continued
Content analysis factors

The key factors affecting operational activity of the construction company
Search Analysis

Phase	Sources		
	Web of Science	Scopus	Manual search
Identification	87	419	17
Screening	total		
	523		
	duplicates		
	61		
	total w/o duplicates		
	462		
	title filtering		
	213		
	total after title filtering		
	249		
	abstract filtering		
	197		
	total after abstract filtering		
	52		
detailed review filtering			
14			
Inclusion in the research	total after detailed filtering filtering		
	38		

149	process component investment component information and methodological component assessment component prompt response component		internal and external space for development partnership component
150	synchronization of targets of different levels resource circulation		
151	Labor Qualifications and skills of workforce		
152	Financial resources		
153		global crisis	
154	sustainable development technologies		
155		conquering new markets	
156		construction company internationalisation secure environment low level of corruption on mature markets	
157		optimal international project management strategy	
158	unless companies are more agile, adaptable and effective	Accelerating globalisation technological changes	
159	permanent and temporary strategies		
160		social and economic activities	
161	knowledge and experience		
162		global crisis	satisfying clients' needs
163	marketing		
164	objectives organizational structure		
165	organizational structure qualities of the staff goals strategy		
166	information chain personnel training personnel management.	urban environment	setup of a consultancy service
167	Bureaucracy flexibility and mobility regulation of the staff inertia of the relationship		
168	organizational structure modernization	changing economic conditions	
169	volume of investments	national economic periods	
170		financial crisis employment	
171		Globalization, increasing complexity dynamic markets technical changes, ecological changes	
172	Organizational factors Human factors Business processes Technology		

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				3	1							
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173	human resources efficiency and effectiveness	Competition requirements of the customers limited resources environmental stewardship	
174	Knowledge management		
175	managing the processes productivity and effectiveness profitability leveraging knowledge		
176	construction risk	organizational external factors	
177	risk occurrence	Political factor economy factor technology factor	
178	management risk material risk design risk finance risk labor and equipment risk	Political factor economy factor technology factor rules and regulations	
179	Human factor Motivation factor Technical factor Safety factor Material and equipment factor Management factor Control factor Time factor		
180	The construction workers themselves Motivating for construction workers Working tools and objects of labour Organization and management production on site Labour safety Working time Working conditions	Natural environment and society	
181	lack of project management proficiency Construction Accidents at Site Price Fluctuations.	Issuance of Work Permits, Unseasonable Weather Conditions, Client's Financial Issues,	Conflict Between Contractor and Other Contracting Parties, unreliability of the assigned subcontractors
182	Construction materials planning and management		Supplier's timing tool and machinery availability
183	human resources		
184	faulty works lack of project information poor workmanship.		project changes during execution equipment unavailability Materials unavailability
185	overcrowded work areas crew interference lack of on-site cleanliness inspection delays		poor materials quality.
186	owned part of the works playing with the competition between subcontractors		
187	processes will take up a specific takt-time		

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204	Labor related factors Management related factors	Industry related factors	
205	Lean construction industrialization		
206		economic conditions	
207		economic conditions	
208	liquidity uncertainty, due to the limited information		
209	construction procedures labor costs		machinery and equipment
210	Project Related Factor's Category Clarity of the drawings and project documents Complexity of the design Construction method Project scale		
211	Human Related Factor's Category Level of Skill and experience Ability to adapt to changes and new environments Labour motivation Worker's integrity Number of breaks and their duration Working overtime		
212	Management/Organizational Related Factor's Category Clear and daily task assignment Delays in payments to workers Coordination between crews Improper coordination of subcontractors Insufficient supervision of subcontractors Inadequate planning Delays in payments to suppliers Unrealistic scheduling High congestion Rework Reallocation of laborers Lack or delay in supervision Incentive policies		Communication problems
213	Materials and Tools Related Factor's Category Unsuitability of materials storage location		Shortage or late supply of materials Tools or equipment shortages

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214		Environmental Related Factor's Category Motion's limitation in the jobsite High/low temperatures Performing work at night Rain Influence of working at height High winds Distance between construction sites and cities Air humidity	
215	time cost quality		
216	safety and health financial aspects	environmental aspects	stakeholder management customer satisfaction
217	, Scope clarity of the project, Rework, Project managers authority to take financial decisions and selecting key team members, Timely payment of completed works, Ability to handle the crisis by the pm, Use of inappropriate planning tools and techniques, Quality, Leadership qualities, Top management support to pm, Cost, Project coordination meetings, Inadequate project formulation in the beginning, Obsolete construction equipment's, methods and technology, Conflict of interest among team members, Availability of training and development for enhancing of skills	Site clearance/availability, Urgency emphasized by the owner while issuing tender, political and economic environment, Climate conditions, Interest and inflation rates, Availability of accurate historical information, Social environment	Contractual disputes, Design capability and frequent design changes, Coordination between all stakeholders Human resource and labour strike, Availability of resources, Customer/client satisfaction Exceptional difference between client and architect Claim genuineness, Developing and maintaining a short and informal line of communication,
218	people, technology		machinery
219	construction methods site management labour		production resources materials equipment
220	poor working conditions		
221	Poor management style, Unrealistic deadline, Designed construction methods, Training and Skill development, Management of material supply,	Distance and location of sites, Language barriers, Accommodation of the workers	Availability of resources,
222	Project characteristics contractual arrangements interactive processes.		project participants

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	Time availability Project management involvement Project management capabilities Capacities of the project team Authority and expertise of project team members Clear goals and expectations Doing inspections and recordings of work	Economic risks	
223			Formal and informal communication with residents.

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total	58	18	43	117	18	46	75	65	15	55	94	28	35	667

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Appendix 8 continued
Content analysis factors

The key factors affecting operational activity of the construction company

#	Factor	Frequence	%	Domain	Frequence	%
1	Stackholders management	58	8,7%	Reciprocal	119	17,8%
2	PR and Communication	18	2,7%			
3	Availability of resources	43	6,4%			
4	Pestel	117	17,5%	External	135	20,2%
5	Globalization	18	2,7%			
6	Risk management	46	6,9%	Internal	413	61,9%
7	Human resources	75	11,2%			
8	Financial resources	65	9,7%			
9	Targets	15	2,2%			
10	Structure and organizational behaviour	55	8,2%			
11	Quality of processes' management	94	14,1%			
12	Short-term planning	28	4,2%			
13	Strategic long-term planning	35	5,2%			
Total		667	100,0%		667	100,0%

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Interviews⁴ were conducted in September-November, 2021.

Each expert was asked to list factors affecting operational activity of the construction company

Nr	Question	Experts answer
1	Factors affecting operational activity of the construction company	<p>Expert 1 – board member of the construction company, 11 years of experience.</p> <ol style="list-style-type: none"> 1. Financial resources of the company; 2. Human resources (professionalism, education, skills, motivation, involvement etc); 3. Structure and internal processes of the company; 4. External environment (market (home Vs foreign), legislation, economic situation); 5. Balanced portfolio; 6. Determination 7. Good management practise; 8. Timely planning.
2	Factors affecting operational activity of the construction company	<p>Expert 2 – CEO of the construction company, 19 years of experience.</p> <ol style="list-style-type: none"> 1. Lack of skilled and dedicated employees (team); 2. Communication. (internal and external); 3. Tax and legal policy of the government ; 4. Project management and control processes; 5. Free working capital and guarantee line; 6. Corporate goals and development strategy; 7. Risk management.
3	Factors affecting operational activity of the construction company	<p>Expert 3 – CEO and owner of the construction company, 31 years of experience.</p> <ol style="list-style-type: none"> 1. Professional team; 2. Organizational structure; 3. Project management; 4. Quality control ; 5. Planning; 6. Supply chain of materials and equipment; 7. Financial stability, ability to provide bonds; 8. Presence in different markets; 9. Diversification of the activities; 10. Image and reputation of the company.

⁴ According to K.T.Ulrich and S.D.Eppinger, “Product design and development”, 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

<p>4</p>	<p>Factors affecting operational activity of the construction company</p>	<p>Expert 4 – Senior project manager of the construction company, 17 years of experience</p> <ol style="list-style-type: none"> 1. Clients and regulatory bodies' requirements; 2. Free cash flow and financial resources; 3. Employees motivation; 4. Relationship between top managements and mid-level management stratum; 5. Relationship with subcontractors and suppliers; 6. Project management quality; 7. Staff education and training; 8. Technical and engineering knowledge; 9. Clear path for company's development; 10. Transparent internal communication; 11. Cross-departmental cooperation; 12. Corporate culture of quality and delivery on time; 13. Relationship between headquarters and branches; 14. Perception of the company among partners; 15. Participation in partnerships and joint ventures;
<p>5</p>	<p>List of factors found within the research</p>	<ol style="list-style-type: none"> 1. Stakeholders management; 2. PR and communication; 3. Availability of resources; 4. PESTEL. 5. Globalization; 6. Risk management; 7. Human resources; 8. Financial resources; 9. Targets; 10. Structure and organizational behaviour; 11. Quality of processes' management; 12. Short-term planning; 13. Strategic long-term planning.
<p>6</p>	<p>Results</p>	<p>All experts agreed that factors determined within the research affect operational activity of the construction company and fit the situation in the construction industry.</p>

Interviews⁵ were conducted during period of November, 2020 -February, 2021.

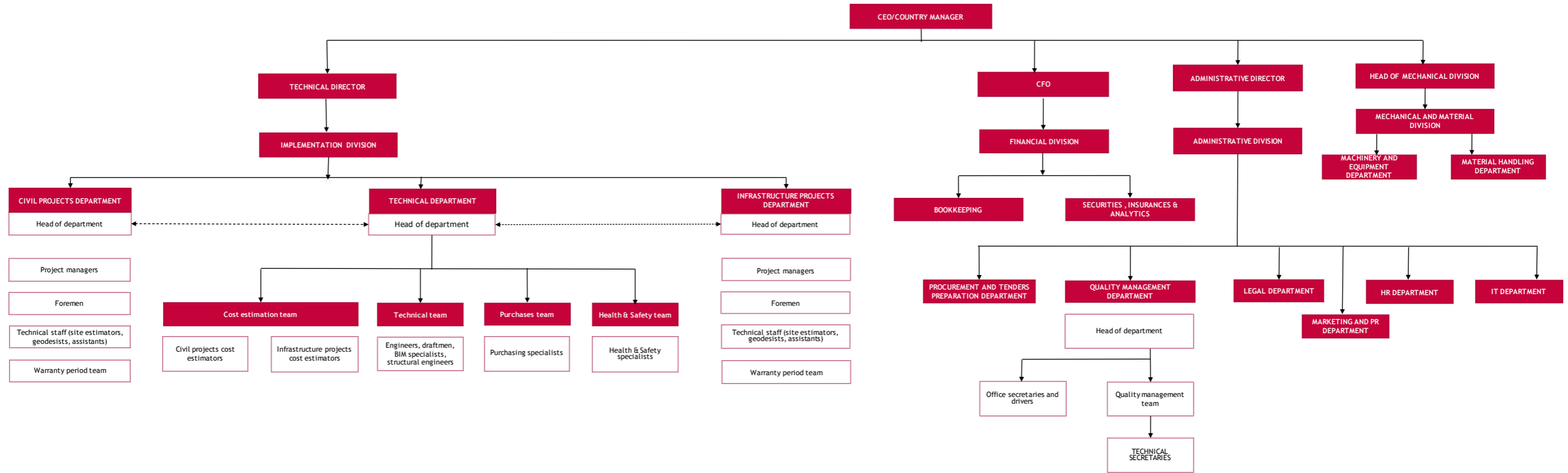
Each expert was asked to list functions to be obtained within construction company and author discussed with the experts the essence of each function.

Nr	Question	Experts answer
1	Functions to be obtained within construction company	<p>Expert 1 – board member of the construction company, 20 years of experience.</p> <ol style="list-style-type: none"> 1. Financial (bookkeeping, bonds, insurances) 2. Human resources 3. Strategic and operational management; 4. Quality control and assurance (health and safety, time schedule) 5. Tender preparation and cost estimation 6. Procurement 7. PR 8. Equipment and machinery 9. Administrative (secretary, office, lawyers ets) 10. Project management and technological expertise
2	Functions to be obtained within construction company	<p>Expert 2 – board member, of the construction company, 16 years of experience.</p> <ol style="list-style-type: none"> 1. Technical knowledge and project management 2. Marketing 3. Tenders preparation 4. Costs estimation 5. Health and safety 6. Quality control 7. Procedures and documentation (Iso, archive, office administration, IT etc) 8. Human resource 9. Equipment maintenance 10. Financial 11. Legal 12. Correct management
3	Functions to be obtained within construction company	<p>Expert 3 – board member, of the construction company, 7 years of experience.</p> <ol style="list-style-type: none"> 1. Construction management (PM, foreman, schedules, procurement); 2. Bookkeeping, including analytics and guarantees 3. Top management 4. Legal 5. Human resource 6. Technical support and quality control 7. Costs estimations and tenders 8. Health and safety 9. Office infrastructure (secretary, IT, ISO) 10. PR

⁵ According to K.T.Ulrich and S.D.Eppinger, "Product design and development", 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

<p>4</p>	<p>Functions to be obtained within construction company</p>	<p>Expert 4 – technical director of the construction company, 18 years of experience.</p> <ol style="list-style-type: none"> 1. Administrative (top management, office, IT, lawyers, ISO procedures, HR, PR, quality control, tenders, cost estimations) 2. Construction management (project managers, foremen, technical support group, procurement, planning, logistics) 3. Financial (bookkeeping, guarantees, insurances) 4. Machinery and material management/maintenance
<p>5</p>	<p>List of factors found within the research</p>	<ol style="list-style-type: none"> 1. Strategic and overall management; 2. Preparation and submission of tender documentation 3. Cost estimation; 4. Legal 5. Financial, including bookkeeping 6. PR and communication 7. Quality management and assurance 8. Administrative (IT, office maintenance and infrastructure) 9. Health and safety 10. Procurement (purchasing) 11. Engineering support 12. Construction projects implementation, including design and maintenance 13. Human resources 14. Equipment and warehouse maintenance
<p>6</p>	<p>Results</p>	<p>Experts agreed about the following structure and functions of the construction company:</p> <ol style="list-style-type: none"> 1. Board/top management 2. Implementation division (project management, logistics, planning, H&S, engineering team, cost estimators, purchasing, planning, quality control) 3. Financial division (bookkeeping, securities, analytics, insurances) 4. Administrative division (tender preparation, quality management, legal, PR, marketing, HR, IT, secretaries, office infrastructure) 5. Mechanical division (machinery, equipment, material storage) – experts agreed that many companies do not obtain this function, but use rented equipment and handle materials based on particular projects needs. <p>The Structure of typical construction company is attached to this protocol (see Appendix 11).</p>

APPENDIX 11
Structure of the construction company



Interviews¹ were conducted during the first quarter of 2021.

4 Experts:

- 2 board members of construction companies (20 and 18 years of experience);
- 2 lawyers working in construction industry (12 and 14 years of experience)

Experts were asked to validate options of legal representations form of the multinational construction companies on the local market in case of expansion.

Nr	Question	Experts answer
<p>4 Experts: - 2 board members of construction companies (20 and 18 years of experience); - 2 lawyers working in construction industry (12 and 14 years of experience).</p>		
<p>1</p>	<p>Legal representation's form of the multinational construction companies on the local market in case of expansion</p>	<p>Experts shared their experience of how international construction companies operate in the local markets:</p> <ul style="list-style-type: none"> - Branch or permanent establishment (PE) ; - Societas Europaea (rare case -for very big entities); - Merger with local company (rare case); - Subsidiary company (new establishment or purchase of existing company); <p>Experts outlined that branch/PE/Societas Europaea/Merger is common, but relatively risky way of operation, since all risks are attributable to the mother company.</p> <p>Subsidiary company – was recommended as more preferable way of operation. The issue of purchasing existing or establishing new company should be decided case by case, pursuant to the policy of the mother company and situation on the particular market.</p>
<p>2</p>	<p>Corporate governance</p>	<p>Experts suggested to review corporate governance of the construction company through Latvian market and review two options of the corporate governance of the Latvian construction company:</p> <ul style="list-style-type: none"> - the subsidiary of the big international existing company; - the company found and developed by individual or small group of individuals.

prepared by Jevgenijs Locovs

¹ According to K.T.Ulrich and S.D.Eppinger, "Product design and development", 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.

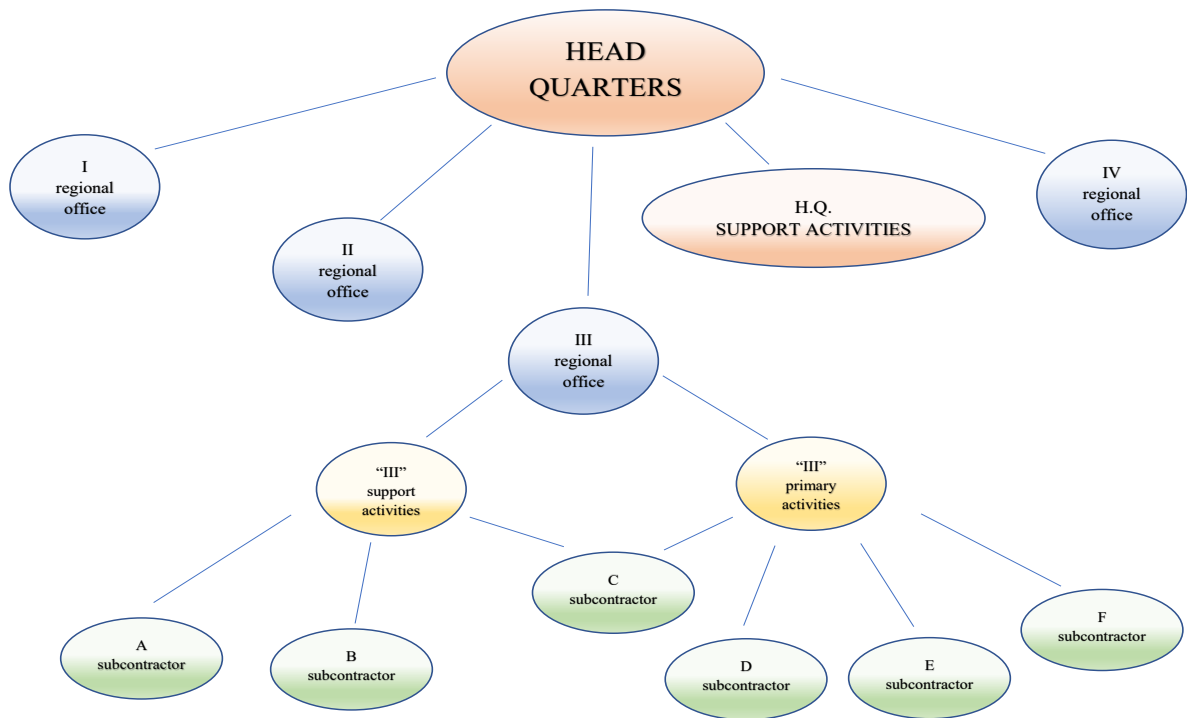
Legal pros and cons choosing the legal form of entering new market developed by author

Factor	Branch/Permanent establishment/SE	Subsidiary company	
		Acquisition of existing construction company	Establishment of the new legal entity.
Liability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Full liability of the Company. In all three options the company expands as core entity and starts operation in the new country.	Liability only of the local legal entity. Mother company is not liable, unless signed guarantee, or has undertaken particular obligations on its self.	Liability only of the local legal entity. Mother company is not liable, unless signed guarantee, or has undertaken particular obligations on its self.
Control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Being integral part of the Company, it ensures stricter and direct control of the operation	Being separate legal entity, it has own management board that should protect the interests of the subsidiary first and then the shareholders, that cannot enforce direct management.	Being separate legal entity, it has own management board that should protect the interests of the subsidiary first and then the shareholders, that cannot enforce direct management.
Corporate values and culture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	The new branch will be staffed from zero, so it supposed introduce, share and enforce the corporate values and the culture of the mother company.	Existing staff at all levels will not be capable and sometimes willing to follow the corporate values and culture of new shareholders.	The new company will be staffed as a new branch, so it supposed easier to accept the corporate values and the culture of the mother company.
Speed of establishment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Usually, the registration of branch or PE is relatively quick process in most EU countries. The registration in construction register and obtaining necessary licenses may take time.	The deep and comprehensive due diligence and sophisticated purchase/shareholders agreement are required. Positive aspects are that Company is registered in all registers and maintains licenses.	Usually, the registration of a new entity is relatively quick process in most EU countries. The registration in construction register and obtaining necessary licenses may take time.
Taxation	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Usually, a local taxation will apply. The double taxation should be excluded.	The entity is acting under local laws and regulation. Parent company's profit is protected.	The entity is acting under local laws and regulation. Parent company's profit is protected.

Legal pros and cons choosing the legal form of entering new market developed by author

Warranties, guaranties and credit lines	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Warranty, guaranty and credit lines of the company.	Assumed to have own guarantee, warranty and credit lines, unless are not sufficient may require support from the parent company.	Has nothing. Parent company should fully support.
References and participation in the tenders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Use company's references and participates as a company	Assumed to have own references, participates in tenders independently. If references are sufficient no involvement of the parent company is needed.	Has nothing. Parent company should fully support. It forces parent company to act as a guarantor or to form and joint Venture to transfer necessary resources and refences.

Operational scheme of the multinational construction company, developed by author.



From organizational point of view all these legal forms of operation shall have very similar structure. They are acting as independent business units making all operational decisions internally. Only reporting and major strategic decisions are done in coordination with the supervising committee from the headquarters of mother company. Usually, the structure of these offices will be similar to that of the local big or midsize companies.

Planning and Program or Concept – the phase when Project's Initiator comes up with general idea and initial program (requirements and characteristics of the future structure or building). According to Ilveskoski and Niittymäki (2015)² The needs, goals, and objectives must be determined for the building. This is very initial, but highly important phase – the Project's Initiator should shape his very general ideas into clearly formulated design task and program. This program will serve a basis and will provide a guidelines to the designers, while the detailed design is being elaborated. The agile technology forming elements to be implemented for this phase can be found in the Table 3.1An

² Olli Ilveskoski & Seppo Niittymäki 2015 "Construction Management. Study Book", publisher Häme university of applied sciences 86 p.

Table 3.1An. : Activities of the **Planning and programming phase** in the concept of corporate agility – created by author

#	Agility forming element	Description of activities Planning and program concept phase	Source of references for the description of the activities
1	Coupling internal resources with external subcontractors	If company has internal resource capable to perform this work it is preferable to use it since the communication within the company will be always quicker and more effective rather with the external agent. In case company does not have such a resource in house. This preparation work can be merely done by outsourced professional resulting in few alternatives for the final approval. Of course a combination of in house and outsource option exists when main work is done internally and some items like focus groups, analytics and etc are outsourced.	Guo et al (2010); Gannet Flemming (2009); Shadan et al. 2012; Fewings & Henjewe(2019); Kragh et al (2018); Pal & Panteleo (2005); Kang et al (2006); Langford & Male (2001); Oberlender (2000); DeWitt et al (2005); Eldring et al (2012); Langford & Male (2001); De Weerd et al (2020); Yitmen and Akyel (2005); Nunnally (2007), Böde et al (2020); Stevens (2007); Böde et al (2020); Tuutti (2005); Ritz (1994); Ilveskoski and Niittymäki (2015); Adler et al (1999); Barbosa et al (2017); Eldring et al (2012);McGregor (1960); Siew (2014); Brockmann and Girmscheid (2010); Kang et al (2006); Motzko et al (2013); Eaton (2008); Mintzberg et al (2006); Kähkönen & Sexton (2005); Parsons (1951); Weber (1946); Sheridan & Kendall (1992);Khalfan et al (2005).
2	Team self-governance and strong discipline	Team work is highly important at any phase, while here it is has lesser impact. There are only few persons involved at this stage, especially in case of full or partial outsource. However, strong discipline, good mood, ability of independent work and decision making, while not losing focus on the final goal will significantly improve the results.	
3	Fluidity	This is a guideline of the whole process. As initial stage of the implementation is as more fluid the way it is being done. The uncertainty, speculations, forecasts, planning, new input data, unexpected changes and so on challenge the project in a course of whole its lifetime. We should not forget that duration of even relatively small construction project, even if there is no need to seek and purchase the land plot – is at least year – year and a half (design and construction). Midlevel projects may last three to five years, while there are mega projects that exceed the decade. Of course, the planning horizon of one year is reasonable, but it is very hard to forecast macro and micro economic situations for three or five years ahead. Single change in legislation may kill the project and make you insolvent. For instance, the change in the law of mortgage security limitation may force banks to raise the share to be covered by mortgage borrower prior bank financing becomes available. As a result the number of mortgage seekers will fall dramatically, afterwards developers will reduce number of new projects, and construction market will shrink as well. Thus the company should be ready to adjust its plans almost at any given moment, how hard it would be. So at this phase of the project fluidity guides the process. Each and every idea/instruction/action taken during the implementation of the project should valued for its fluidity and adjustability to the new circumstances. Author will present below how fluidity is being reduced at the later phases of the realization of the construction project.	
4	Own developed innovation framework	The team or person that works on this project start to shape “WHAT” the company want to build. They turn their feelings and thoughts into clear but still general descriptions of few options. A good sample would be a land plot in the city center, that belongs to the company that pays taxes and guards, but earns nothing. Responsible person comes up with initial idea – should the company develop this plot or it is better to wait? What are the financing and general market conditions? Is there internal financing available or external ? What are the market experts opinions? And so on. If the idea of development generally accepted, the next step should be done.	
5	User-involvement	The next step of program development would be user and other stakeholders involvement. For instance, if zoning allows construction of office, residential, hotel, parking or hospital, then the consultations with market specialists and end customers are to be hold. If there is a one major client for offices usually it reduces both the risk of renting and the income giving a bulk discount. In this case the end user provides the program and only price issue would left. If there is a request for residential or there is no one anchor client then deeper investigation is required. Analytics, banks, real estate agents, developers and etc. should provide their opinion and recommendations to assist to shape the program. Often for the big project focus groups are being done.	
6	Rapid prototyping	After there is an understanding who and how (internal team, outsource, combination of both) is going to work on the design program. Few alternatives should be elaborated. Alternatives should include financial model, different technical solutions, risk assessment, SWOT analysis, phasing program, forecasts of stoppage at different stages of the project, analysis of redesign consequences and etc. The main aim of modeling different situations that may occur during the implementation of the project is to make as resilient as possible, and as adaptable as possible	

Activities of the building project's phases in the concept of corporate agility

Design – the phase when professional designers (architects and engineers) turn the conceptual ideas into the detailed drawings and models suitable for the implementation. If the previous phase often is being done with limited involvement of the contractor(as a consultant), unless contractor and developer are the same entity, then current phase requires significant mobilization and involvement of the contractor. Khalfan et al, (2005)³ found that via such cooperation the implementers and designers could:

- have early chance to understand needs of the client/customers;
- can discuss options together, which could include Implementers providing “constructability”, critique; etc.

Stevens 2007⁴ found that there is a declining quality of construction documents. Designers work under price pressure from owners / developers. This price pressure forces intense cost / labour management. To make a profit, less time by experienced design people is spent on plans and specifications and thus details and clarity are not there. Frustration by the contractor is the result.

This phase will be reviewed as for “design and build” case. According to Pudzis et al 2018⁵ the design and build approach is considered to be an effective project procurement method in which one organization, in compliance with the concluded contract, is responsible for both design and construction.

As was described above the initial concept is not elaborated in a very detailed manner, and serves as a guideline for further design works. It can be amended and adjusted due to various factors such as availability of the utilities, requirements or changes of normative acts, restrictions of the urban development plan or local zoning; initial costs estimations, requirements of the future operation and maintenance, availability of resources, current and future market situation, financing and many others. On the other hand, now the contract is signed, the final product is defined (building/bridge/jetty/networks with particular technical, qualitative and quantitative data) that Contractor undertook to deliver for fixed money and within agreed timeline. These preconditions force to proceed with the project, while the level of flexibility and uncertainty regarding the technical solutions reduces.

To ensure high-quality preparation of documentation that would be a prerequisite for high-quality construction, it is required to establish close cooperation among all the parties involved. Pukite et al 2017⁶. The agile technology forming elements to be implemented for this phase can be found in the table 3.2 An

³ Malik M.A. Khalfan, Peter McDermott, Ruben Vrijhoef and Salman Asad “The effect of procurement on the integration of the supply chain within the construction industry” 2005, from “Understanding the Construction Business and Companies in the New Millennium” , edited by Dr. Kalle Kähkönen and Dr. Martin Sexton, Published by: VTT –Technical Research Centre of Finland (www.vtt.fi), and RIL –Association of Finnish Civil Engineers (www.ril.fi))

⁴ Matt Stevens “Managing a Construction Firm on Only 24 hours a Day”, 2007; Copyright by the McGraw- Hill Companies Inc. USA

⁵ Edgars Pudzis ,Laura Rozentale – Zalima, Sanda Geipele and Ineta Geipele “Business benefits of implementing the design and build approach in the construction process” Proceedings of the 2018 International Conference "ECONOMIC SCIENCE FOR RURAL DEVELOPMENT" No 47 Jelgava, LLU ESAF, 9 11 May 2018, pp. 275-282 DOI 10.22616/ESRD.2018.032

⁶ I.Pukite, A.Grekis, I. Geipele, N. Zeltins “Involvement of individuals in the development of technical solutions and rules for management for building renovation projects: a case study of Latvia”; 2017, Latvian Journal of Physics and Technical sciences, 2017, N4 p 3-14, DOI: 10.1515/lpts-2017-0022

Table 3.2An: Activities of the Design phase in the concept of corporate agility – created by author

#	Agility forming element	Description of activities Design phase	Source of references for the description of the activities
1	Coupling internal resources with external subcontractors	It is highly important to form a strong team at the beginning of the phase. It would be an exceptional case if no subcontractor is involved, or in opposite the whole team is outsourced. This phase require involvement of the design team (architect, engineers, consultants, surveyors and etc.) and contractor’s team. Such split would be recommended from both technical (professional) and risk management points of view. The outsourced team usually would be staffed from several design companies, when each of them has its unique specialization. The size of the contractor’s team would depend on the size and complexity of the project. The main task of the contractor’s team is to fulfil the requirements of the normative acts and these of the contract, including Client’s program. On the other hand, the they should try to minimize projects costs and make all process as efficient as possible. This coupling of internal and external team members allow to get the best quality, and save money in the midterm. Involving the most professional specialists available on the market for one specific job on subcontract base for the works that are not core works of the contractor, release the construction company from the burden to “invent” work tasks for them when they are not fully loaded. At the same time contractor’s employees like project manager and engineers that will be responsible for the construction at the later stage, will coordinate and supervise the design process protecting contractor’s interests. This symbiosis shapes the perfect room for the resilience of the process.	McGregor (1960); Kang et al (2006); Motzko et al (2013); Siew (2014); Brockmann and Girmscheid (2010); Shadan, et al (2012); Kragh et al (2018); Pal & Panteleo (2005); Kang et al (2006); Langford & Male (2001); Langford & Male (2001); De Weerd et al (2020); Yitmen and Akyel (2005); Böde et al (2020); Stevens (2007); Böde et al (2020);
2	Team self-governance and strong discipline	The team work importance grows with the complicity of the project. The phase of the design is the second most complicated after the construction process from management point of view. The team is combined from subcontracted staff (designers + surveyors) and inhouse team, while the latter will manage the former. Due to the scale and complicity of the projects the teams in construction industry usually enjoy quite high level of independence. This approach allows to attract ambitious professionals to the role of project managers and key engineers, where they can satisfy both their technical and managerial ambitions. The team starts the design works, preferably, should continue to manage the construction process as well, while designers take part in the same process as author - supervisors. The cooperation, governance, atmosphere and discipline of this design team will determine the success of the project. These people will make ALL decisions on technical, financial, and coordination issues of the whole project, that will be very hard to change at latter phase. Thus team spirit and common aim are the key terms at this phase.	Fewings & Henjewe (2019); Tuutti (2005); Ritz (1994); Ilveskoski and Niittymäki (2015); Oberlender (2000); DeWitt et al (2005); Eldring et al (2012); Nunnally (2007); Adler et al (1999); Guo et al (2010); Flemming (2009);
3	Fluidity	After the team is set and it starts to work together and study the project arise a lot problems and questions. On the one hand, there are still a lot of uncertain topics (macro and micro) from the previous phase, but decisions and assumptions are required on another. However, even with increase of the detailing and specification, the fluidity and broad thinking should be kept. The brains of the team should seek for any threat or potential risk, and should stay some room for adjustments, where it is possible.	Khalfan et al (2005); Barbosa et al (2017); Eldring et al (2012); Eaton (2008); Mintzberg et al (2006); Kähkönen & Sexton (2005); Parsons (1951); Weber (1946); Sheridan & Kendall (1992).
4	Own developed innovation framework	The level of innovation here is being reduced from “invention of the project” to “innovative solutions”. Here the team (mainly designers, but not only) should strive for the aim of how to achieve the contractual obligations on the most efficient, economic and safe way. It is important to recall that product of the construction should serve their client for decades. So the team should work not only on the minimization of the construction costs, but also to consider the maintenance during the lifetime. Meaning, that by offering more expensive, in the short run, building solution may save a lot of money during the following operational period. The design phase is the most creative phase of the project. The amorphous ideas and general description from the paper of the program, get bones, flesh and blood in the minds of the architects and engineers. The object is being shaped, formed, structured and planned to improve both the human level of living/usage and environment. The innovation in architectural form or engineering solution may inspire other people to create and innovate in various to construction unrelated fields, like Eifel tower or Egyptian pyramids has done and continue to do.	
5	User-involvement	Despite the creativity and innovative solutions that designers bring, the end user and main stakeholder involvement is a must. It cannot be forgotten that any building or structure has its purpose of use and client that is going to operate it. Contractor’s primary goal is to satisfy the client within contractual limitations, of course. Nevertheless, if there is a mistake or something important was forgotten in the design program such items have to be discussed and solved. Nobody needs 6 lanes bridge that has no maintenance access, or building that has no connection to the sewage. Not only user, but also stakeholders, neighbours, utilities providers and etc should be part of the design elaboration and discussion process.	
6	Rapid prototyping	The design phase is the phase of one big prototyping, which is divided into many sub-phases that also prototype. The designers should come up with few ideas supported by drawings for each major part. In case the drawing or sketch does not provide clear answer or based on that the approval cannot be made, the sample should be produced. It is normal to see façade panel or special pipe connection that should wave any doubts what is going to be the final result. This is highly important to understand that each decision made, or each solution well elaborated at this phase save a lot of resources on the next phase of construction. The approved prototypes have to be kept and may serve as an etalon for the acceptance of the particular work or material.	

Activities of the building project's phases in the concept of corporate agility

Construction – the phase when contractor perform the works implementing the previously invented designed solution at the site. Kähkönen and Sexton (2005)⁷ found that the organization and management of construction is moving toward a model founded on intense, more open, interaction between parties. Performance and competitiveness is being reconceptualized and operationalized through a systems paradigm; be it the organizational unit (for example, regional innovation systems, global alliances and partnering arrangements); the procurement regime (for example, PFI or PPP); or production (for example, off-site manufacturing). It is no longer credible to operate in a closed, linear way. The era of compartmentalized contributions from different construction actors is vanishing and, in its wake, new opportunities are opening up through greater transparency and closer collaboration and cooperation.

This is the most complicated and challenging phase from both costs and technological points of view. At this phase team of professionals (project manager, site managers, foremen, procurement specialists, surveyors, designers, workers, technical secretaries and assistants shape the designed on the paper (or digital environment) ideas from “Glass and Concrete”. If the previous phases were phases of ideas and solutions, current phase is the one of the realization and huge resources management.

According to DeWitt et al (2005)⁸ there is an entire spectrum of traditional and alternative new methods, including design-bid-build, design-build, design- build-operate, and a variety of public-private partnerships that allocate more risk to the private sector and/or create more motivation for total life cycle maintenance and operation solutions from the private sector. The involvement of the designers becomes limited, keeping the supervisory function only, while contractor significantly increases its team. This phase will be reviewed as for “design and build” case as well. As was described above the design should be elaborated in a detailed manner, so the contractor should perform its works according to the drawings, not wasting time for any inventions and further design activities, which may cause a delay and huge financial losses, when the construction site enters an idle mode. Unfortunately, usually the reality is different. In order to minimize costs and keep the time schedule, the contractor's team should implement high level of involvement, perform significant planning ahead and deploy strict quality control system. Very few insignificant changes can be introduced during this phase, unless the costs are the time schedule are affected. The development of the construction technology evolves during the design phase, continues in the office during the phase of preparation of the cost estimation, and maintained during the construction phase. Wilkinson and Scofield (2003)⁹ discuss the advantages and disadvantages of the project management system. They suggest that when a project manager is employed, then the program may be shortened due to the project manager using increased knowledge of project planning. By concentrating on management, the project manager can focus on reducing the overall time.

The violations of the obligations of the contractor to deliver the defined project on time and within set budget, usually are resulted in significant contractual penalties and losses

⁷ “Understanding the Construction Business and Companies in the New Millennium”2005 , edited by Dr. Kalle Kähkönen and Dr. Martin Sexton, Published by: VTT –Technical Research Centre of Finland (www.vtt.fi), and RIL –Association of Finnish Civil Engineers (www.ril.fi)

⁸ Steven DeWitt, Gerald Yakowenko, Thomas Bohuslav, Tucker Ferguson, Eugene Hoelker, Keith Molenaar, Greg Schiess, John Smythe, James Triplett, Richard Wagman “Construction Management Practices in Canada and Europe ”, 2005, Office of International Programs.US Department of Transportation. Federal Highway Administration

⁹ Wilkinson, S. & Scofield, R., Management for the New Zealand Construction Industry, Auckland, Prentice Hall, 2003

APPENDIX 14 CONTINUED

Activities of the building project's phases in the concept of corporate agility

compensations, which in their turn may reach huge numbers due to the large scale of the projects. Despite all that factors such as availability of the utilities, requirements or changes of normative acts, restrictions of the urban development plan or local zoning; initial costs estimations, requirements of the future operation and maintenance, availability of resources, current and future market situation, financing and many others cannot be ignored as well. The agile technology forming elements to be implemented for this phase can be found in the table 3.3 An

Table 3.3 An: Activities of the Construction phase in the concept of corporate agility – created by author

#	Agility forming element	Description of activities Construction phase	Source of references for the description of the activities
1	Coupling internal resources with external subcontractors	<p>Key issue within the implementation phase. There is no construction company in the world that may perform 100% of the works with its own workforce. It is also not needed. As was mentioned above the risk management dictates the ratio company should maintain between the inhouse and outsourced activities. It is recommended to remain “pure” general contractor with professional project management and engineering staff in the shrinking market, involving cheap subcontractors and suppliers, while it is preferable to have as much internal resources in the growing market, due to the lack and/or high costs of the external resources. Even the companies that rely mainly on their own workers and equipment will cooperate with suppliers of specific materials, rare equipment or using some small contractors for the unique works. The art of project management is to see the whole picture and to forecast the escalation of the project. Often when experience site manager or project manager sees that particular work or scope of works might delay, turning into to the bottleneck for the significant part of the project – proactive actions has to be taken. Either by bringing additional internal resources, switching into shifts work, finding another approach or solution, or by attracting extra subcontractor to avoid the threat of idle or delay. Coupling internal and external resources is essence of any construction site management. However, it is very complicated issue and requires professional technical knowledge, contractual understanding and diplomatic skills.</p> <p>Thus timely planning, tender arrangement, contract signing and deploying the subcontractor together with company’s own force are very important for the overall project’s success. The ideal situation would be if all major works were done partly by subcontractors and partly by own labor force. The ratio of circa 50/50 would ensure that no all eggs are put in one basket. Meaning that in case of delay or failure in particular work, the additional resources for recovery are brought quickly and no time of mobilization and design study is required. In case the general contractor has no own resources it is recommended to split big and important works between at least two subcontractors. These approach may save the whole project. Another important issue is to transfer to the subcontractor as much responsibilities and risks as possible, to make its contract stricter or as close as possible to the conditions of the main contract. Unfortunately, it almost never happens. The size of the contractor’s team would depend on the size and complexity of the project. It is highly recommended to continue the realization of the project with the same team that managed the design. Of course, the construction period team will be much bigger rather than design period one. Apart managing the subcontractors and workers, planning the works and ordering materials, contractor team should maintain strict quality control. It is important to remember that due to the high costs of the construction works and site maintenance, each mistake may lead to huge losses. The violation of normative acts and standards, in terms of quality or safety may threat human health and lead to the criminal responsibility.</p>	<p>Fewings & Henjewe (2019); Tuutti (2005); Ritz (1994); Ilveskoski and Niittymäki (2015); Oberlender (2000); McGregor (1960); Kang et al (2006); Motzko et al (2013); De Weerd et al (2020); Yitmen & Akyel, (2005); Nunnally (2007); Böde et al (2020); Kragh et al (2018); Parsons (1951); Weber (1946); Adler et al (1999); Sheridan & Kendall (1992); Pal & Panteleo (2005); Kang et al (2006); Barbosa et al (2017); Langford & Male (2001); Stevens (2007); Böde et al (2020); Siew (2014); Brockmann & Girmscheid, (2010); Shadan et al (2012); DeWitt et al (2005); Eldring et al (2012); Guo et al (2010); Flemming (2009); Khalfan et al (2005); Eldring et al (2012); Eaton (2008); Mintzberg et al (2006); Kähkönen & Sexton 2005;</p>
2	Team self-governance and strong discipline	<p>As was mentioned in the previous phase the importance of the team grows along the progress of the project. It reaches it top during the construction period. The following of normative acts, quality, safety, works planning and managing, contractual obligations, design requirements, work with authorities, supervisors, stakeholders and the Client and etc all these are project team responsibilities. These responsibilities cannot be kept without discipline within the team and its self-governance. In general each midsize or large construction project is a kind of independent sub-entity within the company. In terms of turnover there are many projects that may exceed turnover of most of the companies in the same country. Big project’s team includes not only engineers and technical staff, but it usually incorporates within itself such support functions like lawyer, bookkeeper, procurement, secretaries, quality control, HR, PR and sometimes IT. All these provides quite large level of independence, but on the other hand requires much more accountability. There is external Client’s supervision, authorities checks, author supervision and certain “visiting” inspections from the head quarter. However, the whole responsibility still lies on the project team’s shoulders. The self-discipline and good mood among the team members solve significant part of the problems. Since self - discipline and self – governance mean that each team member understands both his/her tasks and duties, and common project goal. It means that he or she understands that if they do not work with 110% output their team mates will be forced to do it instead of them, since the requirements and time schedule of the project stay unchanged.</p>	
3	Fluidity	<p>the level of fluidity here moves from resilience of the entire project (shape, design general solutions, financing issues and etc.) to the level of details. The plan and schedule that project team develops have to contain critical path and few options in case some major issues go wrong: late delivery of the material, lack of machines, failure of one or few subcontractors and etc. The way the things are being planned and managed should leave some room and to have back up plans for unexpected situations, that will come for sure. The risk analysis, brainstorming, immediate detection of the potential threats and implementation of the designed solutions through critical review, should be the general guideline for the construction process.</p>	
4	Own developed innovation framework	<p>It may seem that all the innovations left at the design stage. In ideal world they should. The design should include all the details needed to construct and deliver the project, when it includes not only general solutions, but also the approaches and instruction of how the particular work should be performed. However, the reality differs. In the case of the “design and build” the involvement of the contractor’s technical team should minimize such uncompleted topics, and to think whether the suggested solution is reasonable, effective, cheap, safe, qualitative and doable. There is a common practice at the design phase when designers make necessary calculations, provide general solutions, but they do not invest a lot of thinking in how this solution can be implemented. Will it contradict with other part of the design? Very often that lack of coordination between the different parts of the design is that cause most of the problems at the construction site. Technically complicated projects, like large scale buildings or infrastructure, especially reconstructed, requires highly creative and innovative approach. The big volume of uncertainty, assumptions, limitations and etc. will force project team to build from the wheels, rearranging the site and work order few times per project.</p>	

Table 3.3 An: Activities of the Construction phase in the concept of corporate agility – created by author

5	User-involvement	<p>There is a permanent conflict on the site. The Client wants to get more for the set amount, while the contractor wants to deliver as less as possible. Another issue is that often the Client is not the final user, that may not be known at moment of contract signing or just was not involved. For instance, building an office building the client may be investment fund that will hire operating company for renting and maintaining premises, while the end user will be the tenant that will enter this building. The latest participant is usually unknown till quite late stage of the project thus very often that new inputs that come from there affect the works, costs and schedule. In opposite the operator, whether the Client himself or delegated team, should be involved from the very beginning, to minimize the disputes and to make the final product as suitable as possible to the Client’s needs. Thus involvement of the end user or operator is highly important, since in case of any changes these can be introduced as earlier as possible and will have less influence on the building process. The second the client and/or end user will be sure that works are being performed qualitatively. The third the involvement of the client or other stakeholders during the construction process will increase mutual trust since the problem will be discussed at the very beginning with minimal “surprises” at the end. The fourth the open and good relation with the Client assists contractor better to negotiate different issues and increases chances of getting another order and additional works. It is important to remember, that most of the Clients want to benefit from the project, not from penalizing contractor. Thus in many cases if the Client representative sees that despite problems and burdens, contractor and its team did their best, fought till the end, but somewhere failed or have not succeeded, the Customer would appreciate it and may implement minimal penalty or cancel it at all. The only thing is to remember that there is only one master at the site and it is general contractor. Neither Client, nor its supervisor should not directly manage the site or give instructions to subcontractors or workers, unless there is a threat to the health</p>	
6	Rapid prototyping	<p>Prototyping is highly recommended approach that contractor should use. There are a lot of disputes about the quality, the final view, the final detail and other similar topics that being discussed on the construction site. These disputes may take place between the Customer and the contractor, due to the different interpretation of the description, or between the supervisor and the project manager that discuss particular joint or compliance of the work with respective normative act or standard. In such cases, and in case of internal brainstorm for material or solution it is highly recommended to make a prototype. It can be casted piece of wall and slab to agree about the accepted quality of the surface. It can be produced different joints or details to choose the suitable one. It also can be visit the workshop of manufacturer to make sure he follows technology and capable to do the work. This approach serves contractor on the best way. First of all the accepted solution is clear before the main works are started and there is enough time to prepare everything accordingly. Secondly, openness and involvement of the Client or its representative (supervisor) reduces doubts that contractor wants to cheat and to skip the work or to make cheaper or not qualitative solution. The third argument on behalf of prototyping – is that during this demo implementations arise many other questions that sometimes lead to finding much bigger fundamental problems, rather than color of the wall or width of the façade profile.</p>	

Activities of the building project's phases in the concept of corporate agility

Close -out – the phase of the project's delivery by Contractor to the Client and concluding the final financial results of the previous phases. It may seem like short phase, but in fact it may take up to year, depending on the size and complicity of the project. It is combined from two different tasks: delivery to the client and closing internal results and finalizing relationship with the subcontractors. The former task is highly important and requires from the contractor representatives both high emotional intelligence and deep technical knowledge of the project.

Shockley-Zalaback (1991)¹⁰ suggest that effective communication is important for successful delivery of project as it has been linked to team effectiveness, the integration of work units across organizational levels, characteristics of effective supervision, job satisfaction and overall organizational effectiveness.

The client at this stage has a huge advantage on the contractor. The work generally is done, but there are pending retention money, and unpaid works for the last or even two last months. Usually, many additional works are still unpaid, or even not approved. Using this situation, the Client often wants to improve his bargaining position on the scope and on the final contract amount. So the contractor should be diplomatic and tough in the same time protecting company's interests. The second process of concluding internal results and closing contracts with suppliers and subcontractors is far to be simple as well. The position of Contractor towards the suppliers and subcontractors is similar to that that Client holds towards general contractor, but it differs. First of all in order to get the best price and terms general contractor in very exceptional cases may transfer the same contractual and payment conditions it has with the Client to the contract with subcontractor. Usually these conditions are far better for the subcontractor that enjoys quicker payments, smaller bonds and it is responsible for small part of the works, meaning it has much better argumentation to explain the delay due to other's fault. On the other hand, most of such subcontractors are much smaller than general contractor and often cannot afford to go to the court and freeze the money if general contractor decides to withhold the payment. Another important factor is the market situation. In case of growing market general contractor will be forced to show more flexibility in order not to lose potential subcontractor for the further works and in order not to frighten other subcontractors from cooperation. There is an opposite situation on the shrinking market, when general contractor may "play with the muscles" and get more benefiting closing with the subcontractor. The third issue of closing internal budgets requires very detailed check from the team and from the head quarter. The actual analysis has to be done and real picture to be reported. These results may affect not only bonuses of the team, but also a stability of the company itself. For instance, in case of stock company the price of shares may significantly fluctuate when company reports on success or losses for significant project. The banks may review positively or negatively their attitude to the company. Unfortunately, these financial data can be finalized after all previous issues are closed and all final invoices are received. The agile technology forming elements to be implemented for this phase can be found in the table 3.4 An

¹⁰ Shockley-Zalaback,P., Fundamentals of Organisational Communication, New York, Longman, 1991

Table 3.4 An: Activities of the Close-Out phase in the concept of corporate agility – created by author

#	Agility forming element	Description of activities Close out phase	Source of references for the description of the activities
1	Coupling internal resources with external subcontractors	Almost do not exist. Most of the work is being done by general contractors team. The subcontractors are involved only as part of the general contractor's team to deliver project to the Client and to participate in the discussions of closing their own contracts.	Nunnally (2007); Adler et al (1999); Fewings &
2	Team self-governance and strong discipline	A crucial factor for this phase. Very often during the Close-up phase the contractor may gain or lose more than during the whole previous time. Due to the complexity and scale of the project Client using formal approach will have always a reason to pick on something. Of course it may be not qualitative work done that requires to redo and that does not allow or limit the use of the building or structure. However, it occurs extremely rarely. There is a on ongoing supervision during the construction phase that will not allow anything that will not allow total use of the final product. Therefore, often the picking stuff on is a way of Client to gain some benefits for himself. Some additional works to be done, or to be reduced from the payment list, some price reduction, or withdrawal of the claims. Of course we should exclude Clients gross negligence, malicious intentions or criminal damage. Being in very uncomfortable position of completed works, and huge pending money, contractor usually will try to find a compromise. Knowing that contract puts him in underdog position. Here come the diplomacy and knowledge of the contractor representative that leads this giving and taking, balancing between the customer's good mood and his/her company's interests protection. At this point is clear whether the client is satisfied or not by contractor's performance and quality of the final product. Contractor's representative, at the best case it should be the project manager, should be equipped by all papers of amendments, approved additional works, list of other additional requests that were done to please the Customer, but were never claimed as additional works, the list of problems and delays caused by Client and/or its representatives and any other document or fact that shows the good will and cooperation of the general contractor. Here well - organized internal quality control and minimally but clearly bureaucratized process may prevent significant reductions or lead to the remarkable price increase, proving Customer the contractor's truth. The same is applicable to the negotiations with the subcontractors. In addition to the documented issues, sometimes it is useful to involve in this discussion respective foremen from the both sides to show to the subcontractor's management (that usually get involved at this final stage only) that general contractor's claims are reasonable and supported by facts. However, in any case, the main guideline for all mentioned above is to be fair. Team's self – governance plays a great role at the moment of preparation of the final result of the project. It is very important to present realistic results to the management, not important how awful these results are. The truth will be revealed by internal or external auditors anyway, but the reputation of not honest person(s) whom cannot trust will stick for many years.	Henjewe (2019); Tuutti (2005); Ritz (1994); Ilveskoski and Niittymäki (2015); Oberlender (2000); McGregor 1960; Kang et al (2006); Motzko et al (2013); De Weerd et al (2020); Yitmen and Akyel (2005); Böde et al (2020); Shadan et al (2012); Eaton (2008); Mintzberg et al (2006); Kähkönen & Sexton (2005); DeWitt et al (2005); Eldring et al (2012); Guo et al (2010); Flemming (2009);
3	Fluidity	Fluidity is less presented at this phase, usually having clear instructions, incorporated in the contract of how, when and what to be delivered to the client by general contractor, or to the general contractor by its subcontractor. However, fluidity, s always plays a role here as well. The negotiations process should be seen both tactically and strategically. Meaning that sometimes by giving up something that is not as important to the contractor as it is important to the client, may result by gaining much more in other position. The contractor representative should feel when to press, where to release. Starting the negotiations contractor should understand what are his chances to get different claims and how to waive contra claims. It is should be clear whether this is the last time both companies work together, or the cooperation shall be prolonged. All this will shape the set of mind and level of fluidity during current phase.	Khalfan et al (2005); Kragh et al (2018); Parsons (1951); Weber (1946); Brockmann & Girmscheid (2010); Sheridan & Kendall (1992); Pal & Panteleo (2005); Kang et al (2006); Barbosa et al (2017); Langford & Male (2001); Stevens (2007); Böde et al (2020); Siew (2014); Eldring et al (2012).
4	Own developed innovation framework	almost does not exists, unless some creative and flexible conditions are suggested and approved during the negotiations with the client or subcontractors. Closing – up in general bureaucratic process.	
5	User-involvement	Participation of both the final user and the Client have is highly important. The operator's staff has to be trained to operate the building/structure including all its systems. Both of the should take part in the final acceptance to make sure that finished project fits their needs and to certify that contractual obligations are fulfilled or are not and defects to be eliminated.	
6	Rapid prototyping	Almost do not exist at this phase. The final product is being accepted. May be part of proving something in case of dispute or defect repairing.	

Activities of the building project's phases in the concept of corporate agility

Operations and Maintenance = Warranty period – In the scope of this work operations and maintenance are not included. However a Warranty period is integral and important part of the construction project and obligations of the contractor. According to Ilveskoski and Niittymäki (2015)¹¹ warranty period is to ensure that all materials, equipment and quality meet the expectations of the owner that are included within the contract.

There are insignificant number of the contracts, where general contractor has to undertake operation and maintenance on himself. Usually these are infrastructure BOT (built operate transfer) projects. This kind of works are not in the core business of the construction companies and most of the industry's participants do not undertake such responsibilities. Thus we shall not review actual operation and maintenance of the built project, but the activities of the contractor during the warranty period that covers both maintenance and operation. Warranty period lasts several years. It is usually not less than two, but sometimes may exceed ten or even twenty years. However, these are very rare cases. According, to the common practice the duration of the warranty period stands between three to five years, depending on the project, and tender requirements. This phase requires minimal or low involvement of the contractor. Warranty period is dedicated to detect defects during the operation and maintenance period. Due to the variety of reasons, it is not possible to exclude the defects during the construction period. The structure might be damaged by subsidence of the ground, or equipment may not properly work at multi repeating regime and etc. All these defects require time. Thus there is a direct correlation between longevity of warranty period, construction costs and quality of the works. As longer the warranty period is as higher the construction price and most probably better quality. Each repair of defect during the warranty period is a financial loss. Nobody pays for that, in opposite, the damage that is caused by defected element may exceed in hundred thousands of times the costs of the element itself. For instance, one defected pipe connection may cause a flood and damage ten thousand square meters of fully finished and equipped building. Another important issue is to determine what happened and who to blame. Usually, there are five reasons:

- a) force major (natural disaster) – nobody to blame;
- b) the fault of designer – the designer or his/her insurance should cover the damage;
- c) the fault of contractor – contractor should repair on its own expenses. Important to recall that contractor is also responsible for the defects of the manufacturers of different elements;
- d) the fault of operator – wrong use and/or lack of maintenance caused the defect. The operator should compensate the costs of the repairing.
- e) the combination of few factors mentioned above. Very common case, where it is difficult to agree on the level of each participant's responsibility. Often external expert is required.

The agile technology forming elements to be implemented for this phase can be found in the table 3.5 An.

¹¹ Olli Ilveskoski & Seppo Niittymäki 2015 "Construction Management. Study Book", publisher Häme university of applied sciences 86 p.)

APPENDIX 14 CONTINUED

Activities of the building project's phases in the concept of corporate agility

#	Agility forming element	Description of activities Operations and Maintenance (Warranty period) phase	Source of references for the description of the activities
1	Coupling internal resources with external subcontractors	The combination of the resources would be done at the same proportion as were works split during the construction phase. Meaning that during warranty period general contractor coordinates the own work force and subcontractors for defects elimination. The general contractor team during the warranty period should ensure responsible coordinator that has to arrange quick reaction time in case of warranty call and later coordinate all necessary works and resources, if needed	Barbosa et al (2017); Eldring et al. (2012); Ilveskoski & Niittymäki (2015); Oberlender (2000); McGregor 1960; Kang et al (2006); Motzko et al (2013); De Weerd et al (2020);
2	Team self-governance and strong discipline	highly important topic. It is forbidden to forget that object is being operated and all defects elimination should be first of all coordinated with operator and other stakeholder, to exclude or minimize the negative impact this situation may provide on their daily business or life. The person nominated as a general contractor's representative should act quickly, precisely and diplomatically. He or She should have a helicopter view on the problem. Simultaneously, the coordinator should work on technical and technological solution, and to get clear who's responsibility it is, and who is going to pay for these works.	Pal & Panteleo (2005); Kang et al (2006); Yitmen and Akyel (2005); Böde et al (2020); Shadan et al (2012); Nunnally (2007); Adler et al (1999); Fewings & Henjewe(2019); Tuutti (2005); Ritz (1994); Eaton (2008); Mintzberg et al (2006); Kähkönen & Sexton (2005);
3	Fluidity	Fluidity exists at very limited volume. The works should be planned always having plan "B" just in case, the operator will not be able to provide full work front or some unexpected issue occurred.	DeWitt et al (2005); Eldring et al (2012); Guo et al (2010); Flemming (2009); Khalfan et al (2005); Kragh et al (2018); Parsons (1951);
4	Own developed innovation framework	almost does not exist, apart the case of finding the responsible and planning the works in a manner to minimally disturb routine operation of the object. The seeking for the reason should be done with the open mind, not only due to the financial consequences, but also to eliminate defect's origin for good, and not just fight the consequences.	Weber (1946); Brockmann & Girmscheid (2010); Sheridan & Kendall (1992); Langford & Male (2001); Stevens (2007); Böde et al (2020); Siew (2014).
5	User-involvement	Participation of user and/or operator is highly important. The precise description of what and how happened, or how defect was detected assists a lot in the solving of the problem. Also the operation logs and maintenance books have to be filled and presented in case of warranty event.	
6	Rapid prototyping	Almost does not exist at this phase. May be part of proving something in case of dispute or part of defect repairing solution development.	

The interviews were conducted in 2019

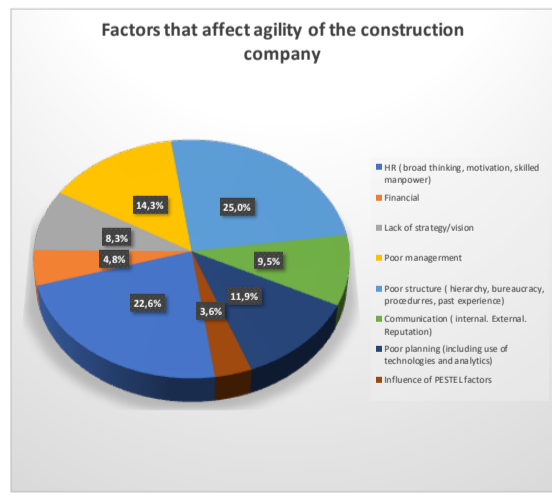
(According to K.T.Ulrich and S.D.Eppinger, "Product design and development", 3rd edition, 2003, McGraw-Hill/Irwin, USA. Four One-on-One interviews provide more than 80% of needs identified.)

prepared by Jevgenijs Looovs

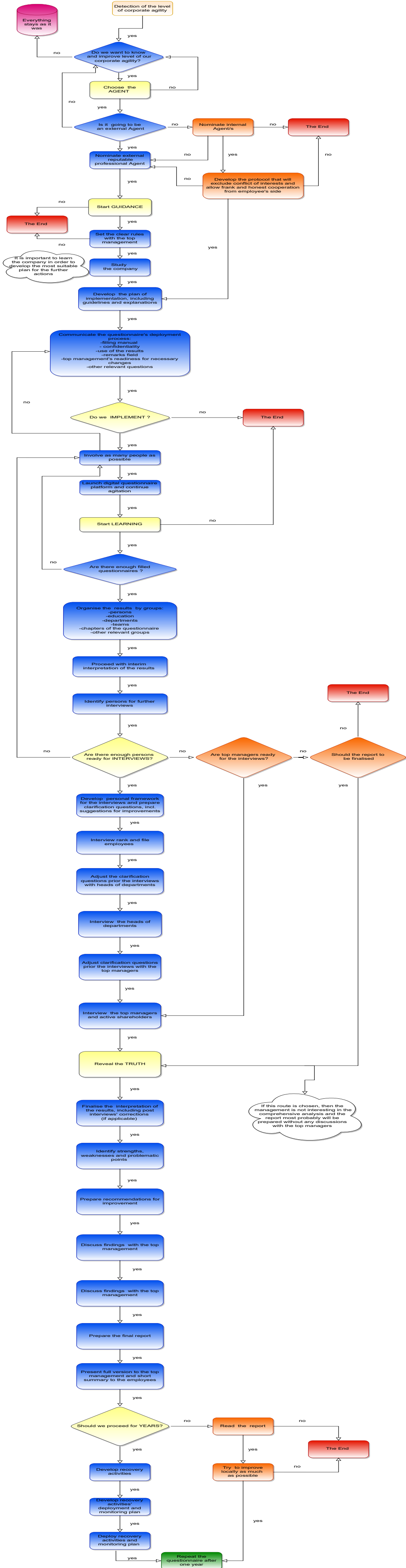
	1	2	3	4	5	6	7	8
CEO 1 (international company 18 years of experience)	Senior PM 1 (domestic company 16 years of experience)	Construction director 1 (international company 13 years of experience)	CEO 2 (international company 9 years of experience)	CEO 3 (international company 10 years of experience)	Construction director (domestic company 20 years of experience)	Business development director/CFO (international company 10 years of experience)	CLO (international company 9 years of experience)	
HR (rare people with ability to think broadly, independently un make decisions)	Many small decisions are made just by main management (not in each level by themselves);	стереотипы/опыт предыдущих компаний	Poor corporate governance and structure	Korporatīva uzbūve (padome, valde, departamenti un tml) apgrūtinā lielo lēmumu pieņemšanu.	neefektīva lēmuma struktūra – kooperatīvā struktūra uzbūvēta tā, ka nevar pieņemt tūlītējus lēmumus, kurus uzreiz realizē (smagnējas, birokrātiskas lēmuma pieņemšanas struktūras);	SAREŽĢĪTA, DAUDZPĀKĀPIJU ORGANIZĀCIJAS STRUKTŪRA AR NESKAIDRI DEFINĒTĀM PILNVARĀM UN ATBILDĪBĀM	Low professionalism of employees - if employees are not capable to understand the environment in which the company operates, they won't be able to identify neither challenges nor opportunities.	
2 lack of motivation / ambitions	Lack of long-term collaboration subcontractor	характер и жизненная позиция руководства/пессимизм	clear strategy	PĀŠI domājolo cilvēku trūkums, Pofigisms	dotajā brīdī pieejamā lēmuma pieņēmēja trūkums;	VADĪBAS KOMPETENCES TRŪKUMS BIZNESA VADĪBĀ (KONKRĒTI PERSONĀLA UN PĀRMAINU VADĪBĀ)	Mid-level managers- the stricter corporate hierarchy is in the company, the bigger risk is that mid-level managers will suppress signals from other employees regarding risks/challenges/opportunities.	
3 PESTEL ((Political, Economic, Social)	Lack of regular internal rotation of workforce (for improvement of different skills);	нехватка средств	lack of suitable staff	Lieka Birokrātija	informācijas nepietiekamība, lai pieņemtu adekvātu lēmumu;	PERSONĀLA POLITIKA UN UZNĒMUMA IEKŠĒJĀ KULTŪRA, KAS NEVEICINA CILVĒKU TALANTU ATTĪSTĪBU UN SADARBĪBU (TIĒK RADĪTI ZALDĀTI, KAS PĪLDA PAVĒLAS NEVIS VIRSNIEKI, KAS SPĒJĪGI PĀŠI PIENĒMĒ LĒMUMUS + PAUST IDEJAS DARBĪBAS UZLABOŠANAI)	Specialisation of the employees on very limited and narrow tasks.	
4 Lack of skilled and talented professionals – low level of education/ knowledge	Negative reputation (because of not successful historical collaboration with some subcontractors);	нехватка нужных кадров	low staff's loyalty		finanšu pieejamība lēmuma izpildei;	TIRGUS ANALĪZES UN DEFINĒTAS UZNĒMUMA STRATĒGIJAS UN SKAIDRU MĒRĶU TRŪKUMS	Lack of or weak cross- department communication of employees and following weak understanding of work of other people in the company.	
5 lack of longterm strategy	Small using of artificial intelligence (BIM, calculations of work volumes, price calculations, lawyer activities for typical and simple tasks)	небольшие вложения или отсутствие вложений в выявление возможностей, которые в дальнейшем можно превратить в существенный доход.	lack of vision		profesionāla personāla trūkums lēmuma realizācijā.	NEPIETIEKOŠA UN NESAVLAICĪGA BIZNESA INFORMĀCIJAS UN ANALĪZES SISTĒMA	Rare revision of company procedures.	
6 Shortterm planning					nepietiekams juridiskais skaidrojums sarežģīta lēmuma pieņemšanai (juridisko risku analīze);			
7 Internal bureaucracy and concrete corporate structure								
8 Lack of financial resources to implement the change								
9 Lack of agility driver at the top management level								
10 Internal communication								
	9	10	11	12	13	14	15	
Senior PM (international company 27 years of experience)	HR director (international company 13 years of experience)	Senior PM (international company 22 years of experience)	CEO 4 (international company 55 years of experience)	CEO 5 (experience in Latvian and Lithuanian markets company 12 years of experience)	CEO 6 (international company 21 years of experience)	CFO (international company 7 years of experience)		
1 Отсутствие четкой внутренней системы/guidelines/алгоритма обработки поступающих запросов/решения вопросов с обозначенными временными рамками реакции и четким пониманием правильного человека для обработки запроса/решения вопроса внутри компании;	Stagnation in employees' professional and personal development.	frozen minds" and fear of changes at top management level	Люди - создание команды, обучение, сертификация, обмен знаниями и информацией	отсутствие , в подавляющем большинстве, способности персонала среднего и высшего руководящего уровня (ниже правления) видеть "большую картинку"	Ungrounded strong belief in the company's strategy and rejection of variations	Lack of management attitude/ tone on the top (not emphasizing/promoting capturing of opportunities or threats to everyone in the organization)		
2 Отсутствие необходимых компетенций/способностей у работников компании, неспособность сотрудников компании принимать самостоятельные решения;	Employees need constant training, growth and challenges to be able to adapt to and succeed in new circumstances.	misunderstanding/ not detection of the need for change	Процессы – разработать стандарты, шаблоны, автоматизировать процессы	2) неспособность выйти за рамки привычного бизнес процесса	Excessive bureaucracy of daily/weekly operations	Poorly designed corporate governance (unbalanced Board with responsibilities and decision path not clearly defined), authoritative management style (bias on one person's skills)		
3 Консервативность компаний, нежелание идти на новые рынки/делать отличные от ежедневного вещи;	Self-insulation from sectoral organisations.	corporate structure where members are not able to perform different tasks, narrow specialization	ИТ - возможность оперировать удаленно, дигитализация, экосистема	3) как правило, строгая иерархическая организационная структура, где людей заботит только своей участок работы	Incorrect drivers for decision making processes	Inferior incomplete internal communication (lack of bottom to top feedback, not timely)		
4 Сложный многоступенчатый путь принятия решений в компании;	Involvement in sectoral associations and organisations provides a broader view on the current and prospective situation in the industry as a whole, gives the possibility to affect legislative decisions and model future market situations in advance.	lack of financial capacity to deploy the change, (purchasing new equipment/ training for employees and etc)	программа - критерии выбора, управление ,	неправильная мораль и устоявшиеся подходы и привычки (мой хит: "обсудить с субординационными победителем - ПЛОХАЯ ПРИМЕТА!!!)"	Blurred responsibility of decision makers	Lack of centralized body of knowledge (what we can do? Is this an opportunity?)		
5 Не сплоченность коллектива, отсутствие командного духа и взаимопомощи в решениях ежедневных задач и проблем.	Refusal to accept competitor's success.		Организация - target operating model, культурные и структурные изменения	плохая командная работа	Weak implementation of "new rules and conditions" after decision has been made	Ineffective risk management process, immature and non-integrated into processes (hinders rapid identification and escalation of problems on all levels)		
	You don't have to duplicate the strategy and actions of another company but you can make a compilation of the best practise and apply it in your business in your own way.					Internal process improvement is out of focus (repetitive errors in further projects)		
	Solving problems only when they become apparent.					Information systems do not support timely and all-embracing exchange of information for decision making (capture, escalation, reaction, follow up)		
	Researching new markets, modelling new/different sets of products/services, networking with new partners etc. can help the company to be ready for a change before it comes.							
	Negligence to work culture.							
	Sometimes complying with all the rules and procedures might seem too burdening, but when you have it once on the right trail and close to perfection, it's easier to manage new challenges as you don't need to deal with unnecessary daily issues.							

	1	2	3	4	5	6	7	8
HR (broad thinking, motivation, skilled manpower)	19							
	22,6%							
Financial		4						
		4,8%						
Lack of strategy/vision			7					
			8,3%					
Poor management				12				
				14,3%				
Poor structure / hierarchy, bureaucracy, procedures, past experience)					21			
					25,0%			
Communication (internal, External, Reputation)						8		
						9,5%		
Poor planning (including use of technologies and analytics)							10	
							11,9%	
Influence of PESTEL factors								3
								3,6%

84
100%



APPENDIX 16
Agility flow chart



Experts focus group conference calls. The extract from minutes

Conference calls took place 15.01.2021

Participants (all from construction industry):

Board member of the construction company, 20 years of experience, board member, of the construction company, 16 years of experience, board member of the construction company, 7 years of experience, technical director of the construction company, 18 years of experience.

Experts approved questionnaire for determination of the corporate agility's level within the construction company.

The author developed a questionnaire to detect the level of corporate agility in the construction company. The person should fill his/her answers by giving numbers and levelling his/her agreement or disagreement with the description. The questionnaire should be filled by as many employees as possible from all levels and departments. Each answer has its number that is a score.

There are following blocks in the questionnaire that allow more detail analysis of the results:

- 1st block questions 1-10 – Human resources
- 2nd block questions 11-17 – Communication incl. reputation
- 3rd block questions 18-22 Operational planning and approach
- 4th block questions 23-30 Management and Organizational behaviour
- 5th block questions 31-39 Structure and Corporate governance
- 6th block questions 40-46 Strategy and Values
- 7th block questions 47-57 Financial data
- 8th block questions 58-63 Influence of PESTEL factors (political, economic, social, technological, environmental, legal – external macro factors)
- 9th block questions 64-68 General valuation

Name (optional) :

Age (optional) :

Position (optional):

Department: production/technical/bookkeeping etc.

Experience in industry: _____ years

Education: engineer/ not engineer

APPENDIX 17 continued

Experts focus group conference calls. The extract from minutes

65	Overall organizational stability and development (“1” – super unstable and developing, “5” stable and developing “10” – stable stagnation)																			
66	Overall level of bureaucracy (“1” – super agile, “10” – super bureaucratic)																			
67	Employees’ overall level of satisfaction (“1” – paradise, “10” – hell)																			
68	Individual level of satisfaction with the work for the company (“1” – paradise, “10” – hell)																			

Experts were asked to approve descriptive summary of the questionnaire’s blocks detecting a corporate agility’s level of the construction company (based on the factors affecting the corporate agility of the construction company - see Appendix 15) outlining important points for potential corrective activities if problems or weaknesses are detected.

Nr	Questionnaire’s block’s title	Experts approved descriptive summary
1	Human resources	Human resources – is the principal factor, since organization is nothing but a group of people. Personal and team trainings, personal growth and development programs should improve the broad-minded thinking and motivation of the employees. It might be useful to combine such courses with team-building events. Maintaining a creative and motivating atmosphere and carrying individual approach of “getting know your employees” can make a significant difference. Deep understanding of personal needs and goals, explanation of corporate ones, the routes to express their satisfaction or dissatisfaction with the company, or a particular person, the dialog between the company and employees will undoubtedly improve the situation. Organizing employee engagement activities suggested by the employees during the interviews is a good place to start. Nevertheless, HR will always conflict with production and business, thus it is also important to keep it balanced. The construction company should promote personal growth, but primarily it should qualitatively build projects and earn money. Therefore, the abovementioned should, first serve the interests of the company.
2	Communication	Communication – generally is not considered a top priority by most companies in the construction industry, companies founded and managed mainly by engineers, who rarely look around, but rather concentrate on one goal – to build. However, as was proven, communication, including reputation of the company has a significant (10% share) of impact on corporate agility. External communication includes interviews, participation in events, presentation, presence on the core market, brand awareness, reputation. The abovementioned can be improved by hiring a marketing consultant that may elaborate the corporate style, choose the company’s face, and promote company on the given market. While the later, the reputation,

APPENDIX 17 continued

Experts focus group conference calls. The extract from minutes

		<p>company mainly builds on its actions. A reputable company should avoid scandals, keep its promises, to clients and other stakeholders, should be a trusted partner – these activities require a long-term strategy, since not all most profitable actions are the right one to do. Long-term runners understand that reputation takes years to build and may be lost in just a day. Especially now, in the days of internet, digitalization and immediate news, nothing can be hidden. Thus, such communication and respective behaviour have to be trained, especially by self-example of the top management.</p> <p>Internal communication – all the above is also true also for in-house communication. Employees should respect each other, be polite even if something does not go as they wish, keep promises, but what is more important, they should share information. It is very common for employees to hold back information, guard it as a kind of treasure, while limiting the access to information, in most of the cases, harms the project. Indeed, there is always a certain confidential and sensitive information that has to be protected, but most of it can and has to be shared to improve the performance. Another important component of communication is clarification. If something goes wrong due to employee’s actions, he/she should know about that, and be provided with an opportunity to recover. The reprimand should be done in private, any humiliation has to be excluded. Often, management of construction companies sees its employees as soldiers of sorts, and give them unquestionable orders, rather than involve personnel in the problem solving. Such communication leads to demotivation and degradation of the employees. Furthermore, here the example set by top management is crucial.</p>
<p>3</p>	<p>Operational planning and approach</p>	<p>Operational planning is one of the major reasons for the loss of profit in the construction project. Poor planning and approach are directly related to human capital and communication issues. If a person in the planning position likes his/her job and is broad-minded and creative, cares about the overall success of the company, knowing it means his personal success as well, understands that no construction company’s team or department can be a one-man-show, then he/she will do everything to have the job in the best way, mainly concentrating on planning the works ahead in order to keep up with set the schedule and avoid losses. Another issue might arise if, despite the good will, the employee is not capable to plan ahead, then, due to the personal disorganization, he/she just should change the job or position. In both cases, lack of personal ability to plan or due to the wrong attitude to work, serious adjustments should be made. Internal soft talks and enforcement of necessary processes to force person to plan ahead, involvement of external coach, if needed, should result in improvement. Although this section of the questionnaire is relatively short, it provides important information about the department/team the person is working in. Based on these valuations, the Agent may obtain additional information about the atmosphere within the particular team. Agent, using additional information from other parts of the questionnaire, should detect whether</p>

APPENDIX 17 continued

Experts focus group conference calls. The extract from minutes

		<p>the problem is due to one particular manager, or there is a comprehensive problem in whole department. Special attention should be set on the departments that may cause the biggest losses due to the poor planning – construction sites, tenders, technical department, top management. The planning is a key word in agility – the company should forecast and to be prepared for any change.</p>
4	<p>Management and Organizational Behaviour</p>	<p>Poor management and organizational behaviour are directly related to communication and human capital topics and is integrally linked to planning. This part of questionnaire deals with the ability to accept changes, cooperation between departments and decision-making process. At the same time, management is also responsible for creation of the healthy working atmosphere, mutual trust and communication. Organizational management and behaviour are about how people behave in routine and/or particular situations. The manager has to take care of all problems that prevent professionals to perform their jobs on the best way possible. His/her intervention should be limited as much as possible, and should stay at level of guidance and recommendations, accompanied by continuous light (gentle) supervision. The manager who leads by self-example shows the accountability he/she undertakes, the responsibilities he/she delegates, the attitude and protection of subordinates he/she maintains, which creates a working atmosphere and trust or lack of both. If subordinates do not feel trusted, and do not trust their superior, no agility will exist or assist. They will perform the required minimum, no broad thinking or creativity or passion will appear, and in the end they will leave. Improvement of these skills should be done by internal guidance from the top management and the involvement of external coaches for both individual and group trainings.</p>
5	<p>Structure and Corporate governance</p>	<p>Structure and corporate governance – correct organizational structure and corporate governance are key factors to corporate agility. Here the employees should respond whether they think there is a clear and transparent structure, and whether the level of existing bureaucracy is sufficient or not. If employees detect informal procedures that duplicate and bypass formal ones, if top management cannot make any decision without getting approval from the shareholders, or decisions change with intervention of shareholders, or, the opposite, the whole structure is so hierarchical that not only creating corporate agility, but even ordinary meeting should be scheduled months ahead, then a change is required. If there is no proper structure with flat but clear hierarchy with minimal level of bureaucracy no company will survive in a long run. The structure cannot be based on one or two persons that make all decisions, while others only implement them. The structure should be as flat as possible to avoid unnecessary delays in decision making process. At the same time, it should have a clear hierarchy that should be followed. Here the structure and corporate governance become an integral part of organizational behaviour and vice versa. The correct structure should be filled by right professionals with right work attitude, as even the best professionals shall not deliver any</p>

APPENDIX 17 continued

Experts focus group conference calls. The extract from minutes

		<p>results if are wrongly organized. If the need for structural change is detected, it should be verified via other parts of the questionnaire and the interviews, since structural change is most anguishing. Generally, people resist change. Each Change Agent should choose a tactics how to implement it, depending on many factors shaping particular situation at the given moment. Nevertheless, structural change is highly important and welcome, if required, but it still is followed by physical relocation of the10mployees' mergers or divisions within the company, creating new departments or elimination of existing, promoting and demoting of staff. During structural change there is one fixed rule – never build a company around particular people, always make a right structure, and only then humanize positions. Some people will leave, some will stay, new employees will join, but all this should occur within the previously set cells of the corporate beehive. As in other positions, here the readiness to change, projected from the top, will assist a great deal, the involvement of external consultant will be highly recommended, since he/she would have a fresh perspective on the whole system.</p>
<p>6</p>	<p>Strategy and Values</p>	<p>Strategy and values – this factor deals with strategy and values, or lack of them. Although it may seem that strategy is a topic set on the “clouds”, while values exist “here and now”, these two notions are closely interlinked. Values are an integral part of the company, they shape culture and provide guidelines for both corporate and personal behaviour, they serve as a basis for the short and long-term decisions. Company cannot set strategy if it does not define its values. To have the only value of maximizing profit at any opportunity is also a value, but no one should expect corporate culture and organizational behaviour similar to one used to be called the “wild west”. Setting the company strategy is guided by its values. The goals may not touch upon the values directly and remain the business orientated (profit, expansion, reorganization, new products, etc.) However, the road barrier on the path to these goals will be made out of values. The values and respective behaviour of individuals are dramatically affected by the environment, very few people are able to maintain divergent life norms and continue to live or work in a group (society) where none of its members accept them and have contrasting habits and values. Most people will accept the norms dictated by surrounding society. This is why organizational culture is able to change people, especially young specialists that have very little past experience or do not have it at all.</p> <p>If the employees state that the company has no values it should be reassessed. Most likely top management has their own values, but these were not commonly accepted, and certainly were not communicated. The same is applicable to strategy, if even top management has to strategy, then the value of such management should be reconsidered, but if main strategic goals were not communicated to the rest of the team, then the cure may not be as painful as in the previous case. Setting values and strategy and their communication is a very important component of the corporate long-</p>

APPENDIX 17 continued

Experts focus group conference calls. The extract from minutes

		<p>term success. People who wish to know their career path for the next 30 years do not work in private construction companies, they work in huge financial and state institutions. The construction industry staff is ready for challenges, different locations, joint ventures and expansions. And, even project based contract workers would like to know that company has at least an approximate vision where it navigates for the next few years. Others want to feel certain confidence in their future and to know that their work contributes towards something more than just profit to the shareholders. So, if significant problems with these issues arise, it is highly recommended to consider structural reorganization including replacement of the top management, or external consultant involvement.</p>
7	Financial	<p>Financial factor is next to last among the affecting factors. The financial characteristics are not the origin of the problem, but its result. Due to such lagging effect, the responses should be carefully analysed by Agent. Many employees may not be aware of most of the financial data. Agent should ask people not to search for answers in annual reports or consult bookkeeping, the answers should be provided according to their current knowledge, since it is not the level the level of knowledge that is examined here, but organizational structure, behaviour, information sharing and communication. The data of real financial results should be taken from financial officer directly and analysed, concluding the level of corporate agility accordingly. It is important to analyse the responses to these questions that came from the top managers, then the level of involvement, broad thinking, true information sharing and trust level can be detected. If the latter is not sufficient, the significant structural and personnel reorganization and refresh at the top level is advised.</p>
8	Influence of PESTEL factors	<p>The element with the least weight of impact on corporate agility. Influence of PESTEL factors is considered more as an external macro factor that limits and affects the whole organization, which has to be agile enough to respond to these limitation, while continuing to successfully operate. Analysing the results of this section the question of their dynamic change should be evaluated. Since frequent changes indicate an unstable external environment, so risks and structural changes should be considered.</p>
9	General evaluation	<p>General evaluation – general valuation does not require any particular actions, but it provides a kind of an overall summary of corporate perception of employees. The results received in this part may serve as a benchmark for Agent’s conclusions. And recommendations</p>

prepared by Jevgenijs Locovs

Appendix 18

LNK Industries questionnaire validation

Name	A	B	C
Age	36	40	44
Position	board member	technical director	project manager
Department	board	technical department	construction department
Experience in industry	12 years	20	22
Education	not engineer	engineer	engineer
Gender	male	male	male

#	Factors affecting corporate agility	Organization's level of agility		
		A	B	C
	Human Resources	4.9	6	5.9
1	Ignorance of personnel: needs, suggestions, aims etc. (<i>"1" – we became a social entity, "10" – company does not know that it employs human beings</i>)	5	7	7
2	Impersonal relationship (<i>"1" – we are a family, "10" – I do not know names, only job titles</i>)	4	6	5
3	Training and studying (<i>"1" – we do not study at all, "5" balanced programs are developed in cooperation with the respective department-, "10"- never ending training</i>)	4	6	5
4	Employees' valuation scheme (<i>"1" – does not exist, "10" – very detailed and comprehensive</i>)	5	6	5
5	Complexity of testing procedures for the employees (<i>"1" – clear and simple, "10" – mission impossible</i>)	3	5	5
6	Implementation of employees ideas/opinions (<i>"1" – always implemented, "10" – totally ignored</i>)	5	7	8
7	Alignment of employee's personal goals and corporate goals (<i>"1" – fully aligned, "10" – we aim at different galaxies</i>)	6	6	7
8	Trust in direct manager (<i>"1" – he/she is my guru, "10" – egocentric betrayer</i>)	5	5	6
9	Clear career tracks for employees (<i>"1" – I do not know what I'll do tomorrow, "10" – I know my track for the next 10 years</i>)	6	5	7

10	Previously agreed remuneration/penalties (“1” - the amount of my salary surprises me each month “10” – I know the amount of my salary for the next 10 years)	6	7	4
	Communication incl. reputation	4.43	5.43	5.71
11	General reputation of the company (“1” –the best company to work for, “10” – monster)	5	7	6
12	Open and frank internal communication (“1” – highly supported , “10” – CEO knows better)	2	4	5
13	Open and frank external communication with clients, subcontractors and stakeholders (“1” – highly supported , “10” – CEO tells us what to say)	4	6	6
14	Tolerance of discrimination on any basis (race, gender, sexual, cultural, religious or political background) (“1”– discrimination is totally avoided , “10” – paradise for discriminators)	2	2	4
15	Level of trust and openness between company and its employees (“1”– complete trust, no secrets , “10” – no trust)	4	5	6
16	Level of trust and openness between company and its clients, subcontractors and stakeholders (“1”– complete trust, no secrets , “10” – no trust)	6	7	6
17	Involvement in charity activities (“1” – not involved at all, “10” – we became a charity fund)	8	7	7
	Operational planning and approach	5.8	6.4	6
18	Professional approach of the company (“1” – any project can be implemented, “10” – we build only boxes according to highly detailed drawings)	7	6	7
19	Professional level of my department/team (“1” – we are gods, “10” – the people around me were selected randomly)	5	5	4
20	Level of paper work (reports, inquiries, explanation notes etc.) (“1” – we do not do any paper work at all, “10” – I cannot perform my direct duties due the paper work I have to manage)	6	7	7
21	Operation according to previously set plans and forecasts (“1” - We do not know what we’ll do tomorrow, “10” – we have daily plans for the next 10 years)	6	7	6
	Your superior plans the work ahead, evaluating few potential scenarios.			

22	("1" – we start solving problems a year after their appearance "10" – yes, we have a plan even for the case of invasion of aliens,)	5	7	6
	Management and Organizational behavior	5.75	6.38	6.5
23	Resistance to change (<i>"1" - we are a jelly, "10" – we are a rock</i>)	4	6	6
24	Time needed to make a decision (<i>"1" - everything is done on the spot, "10" – never ending story</i>)	4	5	8
25	Internal focus – minimization of external interruption (<i>"1" - we are open for critics and advises, "10" – everything is decided in-house</i>)	8	8	9
26	Time needed to implement a decision/change (<i>"1" - everything is done on the spot, "10" – never ending story</i>)	6	6	5
27	Level of internal inertia (<i>"1" - everything is done on the spot, "10" – nothing happens</i>)	6	7	7
28	Cooperation between departments and mutual assistance (<i>"1" - we are one team and have one big aim, "10" – other departments only ruin my work</i>)	6	6	7
29	Consequences of quick implementation of decisions/changes (<i>"1" - we are in nirvana, "10" – quick changes ruin company</i>)	5	6	4
30	Focus on corporate command-control system (<i>"1" - we do what we want, "10" – we are told what to do</i>)	7	7	6
	Structure and Corporate governance	4.44	4.89	5.11
31	Structured corporate governance (owners' control and supervision of the management) (<i>"1" - owners are operational managers, "10" – highly structured CG, owners are not involved in operational decisions</i>)	1	1	2
32	Clear and transparent operational scheme (<i>"1" - mess, "10" – crystal</i>)	7	5	5
33	Division of labor (<i>"1" - everybody does everything, "5" – there are both job descriptions and clear understanding of the job responsibilities of other colleagues "10" – I do only what is written in my personal job description</i>).	5	6	6
34	Clear hierarchical authority structure (<i>"1" - flat=I do not even knock before I enter my superior's office, "10" – highly hierarchical – Queen Elizabeth II is closer than my superior</i>)	3	5	4
35	Formal and unbiased procedures (detailed rules and regulation) (<i>"1" - wild West, "10" – every step is formalized</i>)	5	4	6

36	Existence of informal procedures (parallel to formal ones) (“1” – does not exist , “10” –100% of the issues are covered by formal procedures)	3	5	5
37	Effectiveness of informal procedures Vs formal procedures (“1” – we have no informal procedures, “10”- super effective)	2	5	5
38	Division according to functions (“1” - no division “10” – strict division) .	7	7	6
39	Clear definition of duties and definition of level of autonomy.(“1” - mess, “10” – highly structured)	7	6	7
	Strategy and Values	6.86	7.71	7.14
40	Correspondence of corporate values to company’s behaviour.(“1”– company has no values, “10”- totally correspond)	4	6	3
41	Employees’ acceptance of the corporate values and behaviour according to. (“1”– company has no values, “10”- employees try to follow any instruction issued by the board)	6	7	7
42	Dependence on one/few major clients (“1” – many different clients, “10” – one client)	5	7	6
43	Dependence on the State/municipal clients (“1” – do not work with such clients, “10” – work only with such clients)	6	7	7
44	Company’s midterm goals understanding by the employees. (“1”– company has no midterm goals “5”- totally clear, “10” – clear only to the top management)	9	9	8
45	Company’s long-term goals understanding by the employees (“1”– company has no long-term goals “5”- totally clear, “10” –clear only to top management)	9	8	10
46	Employees understanding of the company’s goals achieving strategy. (“1”– company has no strategy “5”- totally clear, “10” –totally clear only to the top management)	9	10	9
	Financial data	6.64	6.55	7.17
47	Turnover of the company (comparing to the market) (“1” – dwarf, less than 10million “10” – princes of the universe, exceeds 100 million)	9	9	9
48	Number of employees (“1” – dwarf, less than 10, “10” – princess of the universe – more than 100)	10	10	10
	Dependence on the own workforce (“blue collars”)			

49	<i>("1" – all works are subcontracted, "10" – all works are done by own workforce)</i>	5	4	4
50	<i>Operation on several international markets ("1" - only one market, "2"- "4" - up to 3 states, "5-9" up-to 7 states, "10" more than 7 states)</i>	5	5	5
51	<i>The biggest market's share in the turnover ("1"- all markets shares are proportionally balanced , "2"- "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%)</i>	8	7	N/a
52	<i>The biggest profit's share per market out of total profit ("1"- all profits shares are proportionally balanced , "2"- "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%)</i>	7	7	N/a
53	<i>Dependence on borrowed capital/leverage of the company ("1" - we do not use borrowed capital, "10" – we do not have our own money)</i>	6	5	N/a
54	<i>Dependence on bank guarantees/credit lines ("1" - we do not depend on these lines at all, "10" – we cannot survive a day without these lines)</i>	9	8	8
55	<i>Lack of working capital ("1" - we are stronger than European Central Bank, "10" – we do not have any working capital)</i>	8	9	7
56	<i>Negative annual cash flow ("1" - always positive, "10" – always negative)</i>	3	4	N/a
57	<i>Financial loses in last 3 years ("1" – super profitable , "10" –insolvent)</i>	3	4	N/a
	Influence of PESTEL factors (external macro-economic political, economic, social, technological, environmental and legal factors)	3.5	4.33	4.83
58	<i>POLITICAL changes frequency occurrence and their influence on your company. ("1" –yes, we adjust our activities on daily basis, "10" –the last political challenge affected our company was the establishing of Rome empire)</i>	3	4	5
59	<i>ECONOMIC changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis , "10" – the last economic challenge affected our company was the Great Depression)</i>	3	4	5
60	<i>SOCIAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last social challenge affected our company was French revolution)</i>	3	3	5

61	TECHNOLOGICAL changes frequency occurrence and their influence on your company. (“1” – yes, we adjust our activities on daily basis, “10” – the last technological challenge affected our company was an invention of bricks)	6	7	6
62	ENVIRONMENTAL changes frequency occurrence and their influence on your company. (“1” – yes, we adjust our activities on daily basis “10” –the last environmental challenge affected our company was an extinction of dinosaurs)	4	4	5
63	LEGAL changes frequency occurrence and their influence on your company. (“1” – yes, we adjust our activities on daily basis, “10” – the last legal challenge affected our company had happened a century ago)	2	4	3
	General valuation	4.8	5.6	5.2
64	Overall organizational behavior (“1” – super fair and agile, “10” – super unfair and bureaucratic)	4	6	6
65	Overall organizational stability and development (“1” – super unstable and developing, “5” stable and developing “10” – stable stagnation)	7	6	6
66	Overall level of bureaucracy (“1” – super agile, “10” – super bureaucratic)	6	6	6
67	Employees’ overall level of satisfaction (“1” – paradise, “10” – hell)	4	6	4
68	Individual level of satisfaction with the work for the company (“1” – paradise, “10” – hell)	3	4	4
	Average	5.24	5.92	5.95

Appendix 18

LNK Industries questionnaire validation

Name A
 Age 36
 Position board member
 Department board
 Experience in i 12 years
 Education not engineer

#	Factors affecting corporate agility	Organization's level of agility										notes
		1	2	3	4	5	6	7	8	9	10	
	Human Resources	4.9										
1	Ignorance of personnel: needs, suggestions, aims etc. ("1" – we became a social entity , "10" – company does not know that it employs human beings)					5						
2	Impersonal relationship ("1" - we are a family, "10" – I do not know names, only job titles)				4							
3	Training and studying ("1" – we do not study at all, "5" balanced programs are developed in cooperation with the respective department-, "10"- never ending training)				4							
4	Employees' valuation scheme ("1" – does not exist, "10" - very detailed and comprehensive)					5						
5	Complexity of testing procedures for the employees ("1" – clear and simple, "10" – mission impossible)			3								
6	Implementation of employees ideas/opinions ("1" – always implemented, "10" – totally ignored)					5						
7	Alignment of employee's personal goals and corporate goals ("1" – fully aligned, "10" – we aim at different galaxies)						6					
8	Trust in direct manager ("1" – he/she is my guru, "10" – egocentric betrayer)					5						
9	Clear career tracks for employees ("1" - I do not know what I'll do tomorrow, "10" – I know my track for the next 10 years)						6					
10	Previously agreed remuneration/penalties ("1" - the amount of my salary surprises me each month "10" – I know the amount of my salary for the next 10 years)						6					
	Communication incl. reputation	4.43										
11	General reputation of the company ("1" –the best company to work for, "10" – monster)					5						
12	Open and frank internal communication ("1" – highly supported , "10" – CEO knows better)		2									
13	Open and frank external communication with clients, subcontractors and stakeholders ("1" – highly supported , "10" – CEO tells us what to say)				4							

14	Tolerance of discrimination on any basis (race, gender, sexual, cultural, religious or political background) ("1" – discrimination is totally avoided, "10" – paradise for discriminators)	2											
15	Level of trust and openness between company and its employees ("1" – complete trust, no secrets, "10" – no trust)			4									
16	Level of trust and openness between company and its clients, subcontractors and stakeholders ("1" – complete trust, no secrets, "10" – no trust)					6							
17	Involvement in charity activities ("1" – not involved at all, "10" – we became a charity fund)								8				
Operational planning and approach		5.8											
18	Professional approach of the company ("1" – any project can be implemented, "10" – we build only boxes according to highly detailed drawings)								7				
19	Professional level of my department/team ("1" – we are gods, "10" – the people around me were selected randomly)					5							
20	Level of paper work (reports, inquiries, explanation notes etc.) ("1" – we do not do any paper work at all, "10" – I cannot perform my direct duties due the paper work I have to manage)								6				
21	Operation according to previously set plans and forecasts ("1" – We do not know what we'll do tomorrow, "10" – we have daily plans for the next 10 years)								6				
22	Your superior plans the work ahead, evaluating few potential scenarios. ("1" – we start solving problems a year after their appearance "10" – yes, we have a plan even for the case of invasion of aliens.)					5							
Management and Organizational behavior		5.75											
23	Resistance to change ("1" – we are a jelly, "10" – we are a rock)				4								
24	Time needed to make a decision ("1" – everything is done on the spot, "10" – never ending story)				4								
25	Internal focus – minimization of external interruption ("1" – we are open for critics and advises, "10" – everything is decided in-house)									8			
26	Time needed to implement a decision/change ("1" – everything is done on the spot, "10" – never ending story)								6				
27	Level of internal inertia ("1" – everything is done on the spot, "10" – nothing happens)								6				
28	Cooperation between departments and mutual assistance ("1" – we are one team and have one big aim, "10" – other departments only ruin my work)								6				
29	Consequences of quick implementation of decisions/changes ("1" – we are in nirvana, "10" – quick changes ruin company)					5							
30	Focus on corporate command-control system ("1" – we do what we want, "10" – we are told what to do)									7			
Structure and Corporate governance		4.44											

31	Structured corporate governance (owners' control and supervision of the management) (<i>"1" - owners are operational managers, "10" - highly structured CG, owners are not involved in operational decisions</i>)	1										
32	Clear and transparent operational scheme (<i>"1" - mess, "10" - crystal</i>)						7					
33	Division of labor (<i>"1" - everybody does everything, "5" - there are both job descriptions and clear understanding of the job responsibilities of other colleagues "10" - I do only what is written in my personal job description</i>).				5							
34	Clear hierarchical authority structure (<i>"1" - flat=I do not even knock before I enter my superior's office, "10" - highly hierarchical - Queen Elizabeth II is closer than my superior</i>)			3								
35	Formal and unbiased procedures (detailed rules and regulation) (<i>"1" - wild West, "10" - every step is formalized</i>)					5						
36	Existence of informal procedures (parallel to formal ones) (<i>"1" - does not exist, "10" -100% of the issues are covered by formal procedures</i>)			3								
37	Effectiveness of informal procedures Vs formal procedures (<i>"1" - we have no informal procedures, "10"- super effective</i>)		2									
38	Division according to functions (<i>"1" - no division "10" - strict division</i>).							7				
39	Clear definition of duties and definition of level of autonomy(<i>"1" - mess, "10" - highly structured</i>)							7				
Strategy and Values						6.86						
40	Correspondence of corporate values to company's behaviour.(<i>"1"- company has no values, "10"- totally correspond</i>)			4								
41	Employees' acceptance of the corporate values and behaviour according to. (<i>"1"- company has no values, "10"- employees try to follow any instruction issued by the board</i>)						6					
42	Dependence on one/few major clients (<i>"1" - many different clients, "10" - one client</i>)					5						
43	Dependence on the State/municipal clients (<i>"1" - do not work with such clients, "10" - work only with such clients</i>)							6				
44	Company's midterm goals understanding by the employees. (<i>"1"- company has no midterm goals "5"- totally clear, "10" - clear only to the top management</i>)									9		
45	Company's long-term goals understanding by the employees (<i>"1"- company has no long-term goals "5"- totally clear, "10" -clear only to top management</i>)									9		
46	Employees understanding of the company's goals achieving strategy. (<i>"1"- company has no strategy "5"- totally clear, "10" -totally clear only to the top management</i>)									9		
Financial data						6.64						

47	Turnover of the company (<i>comparing to the market</i>) (<i>"1" – dwarf, less than 10million "10" – princes of the universe, exceeds 100 million</i>)									9		
48	Number of employees (<i>"1" – dwarf, less than 10, "10" – princess of the universe – more than 100</i>)										10	
49	Dependence on the own workforce (<i>"blue collars"</i>) (<i>"1" – all works are subcontracted, "10" – all works are done by own workforce</i>)				5							
50	Operation on several international markets (<i>"1"- only one market, "2"- "4" -up to 3 states, "5-9" up-to 7 states, "10" more than 7 states</i>)				5							
51	The biggest market's share in the turnover (<i>"1"- all markets shares are proportionally balanced , "2"- "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%</i>)								8			
52	The biggest profit's share per market out of total profit (<i>"1"- all profits shares are proportionally balanced , "2"- "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%</i>)						7					
53	Dependence on borrowed capital/leverage of the company (<i>"1" - we do not use borrowed capital, "10" – we do not have our own money</i>)						6					
54	Dependence on bank guarantees/credit lines (<i>"1" - we do not depend on these lines at all, "10" – we cannot survive a day without these lines</i>)									9		
55	Lack of working capital (<i>"1" - we are stronger than European Central Bank, "10" – we do not have any working capital</i>)								8			
56	Negative annual cash flow (<i>"1" – always positive, "10" – always negative</i>)			3								
57	Financial loses in last 3 years (<i>"1" – super profitable , "10" –insolvent</i>)			3								
	Influence of PESTEL factors (external macro-economic political, economic, social, technological, environmental and legal factors)										3.5	
58	POLITICAL changes frequency occurrence and their influence on your company. (<i>"1" –yes, we adjust our activities on daily basis, "10" –the last political challenge affected our company was the establishing of Rome empire</i>)			3								
59	ECONOMIC changes frequency occurrence and their influence on your company. (<i>"1" – yes, we adjust our activities on daily basis , "10" – the last economic challenge affected our company was the Great Depression</i>)			3								
60	SOCIAL changes frequency occurrence and their influence on your company. (<i>"1" – yes, we adjust our activities on daily basis, "10" – the last social challenge affected our company was French revolution</i>)			3								
61	TECHNOLOGICAL changes frequency occurrence and their influence on your company. (<i>"1" – yes, we adjust our activities on daily basis, "10" – the last technological challenge affected our company was an invention of bricks</i>)							6				

62	ENVIRONMENTAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis "10" –the last environmental challenge affected our company was an extinction of dinosaurs)			4							
63	LEGAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last legal challenge affected our company had happened a century ago)	2									
General valuation		4.8									
64	Overall organizational behavior ("1" – super fair and agile, "10" – super unfair and bureaucratic)			4							
65	Overall organizational stability and development ("1" – super unstable and developing, "5" stable and developing "10" – stable stagnation)						7				
66	Overall level of bureaucracy ("1" – super agile, "10" – super bureaucratic)						6				
67	Employees' overall level of satisfaction ("1" – paradise, "10" – hell)			4							
68	Individual level of satisfaction with the work for the company ("1" – paradise, "10" – hell)		3								

48	Number of employees ("1" – dwarf, less than 10, "10" – princess of the universe – more than 100)										10	
49	Dependence on the own workforce ("blue collars") ("1" – all works are subcontracted, "10" – all works are done by own workforce)			4								
50	Operation on several international markets ("1" – only one market, "2" – "4" – up to 3 states, "5-9" up-to 7 states, "10" more than 7 states)				5							
51	The biggest market's share in the turnover ("1" – all markets shares are proportionally balanced, "2" – "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%)						7					
52	The biggest profit's share per market out of total profit ("1" – all profits shares are proportionally balanced, "2" – "4" – 20%-40%, "5-9" up-to 50%-90%, "10" more than 90%)						7					
53	Dependence on borrowed capital/leverage of the company ("1" – we do not use borrowed capital, "10" – we do not have our own money)				5							
54	Dependence on bank guarantees/credit lines ("1" – we do not depend on these lines at all, "10" – we cannot survive a day without these lines)							8				
55	Lack of working capital ("1" – we are stronger than European Central Bank, "10" – we do not have any working capital)								9			
56	Negative annual cash flow ("1" – always positive, "10" – always negative)			4								
57	Financial losses in last 3 years ("1" – super profitable, "10" – insolvent)			4								
	Influence of PESTEL factors (external macro-economic political, economic, social, technological, environmental and legal factors)						4.33					
58	POLITICAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last political challenge affected our company was the establishing of Rome empire)			4								
59	ECONOMIC changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last economic challenge affected our company was the Great Depression)			4								
60	SOCIAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last social challenge affected our company was French revolution)		3									
61	TECHNOLOGICAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last technological challenge affected our company was an invention of bricks)							7				

62	ENVIRONMENTAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis "10" –the last environmental challenge affected our company was an extinction of dinosaurs)				4							
63	LEGAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last legal challenge affected our company had happened a century ago)				4							
	General valuation						5.6					
64	Overall organizational behavior ("1" – super fair and agile, "10" – super unfair and bureaucratic)						6					
65	Overall organizational stability and development ("1" – super unstable and developing, "5" stable and developing "10" – stable stagnation)						6					
66	Overall level of bureaucracy ("1" – super agile, "10" – super bureaucratic)						6					
67	Employees' overall level of satisfaction ("1" – paradise, "10" – hell)						6					
68	Individual level of satisfaction with the work for the company ("1" – paradise, "10" – hell)				4							

Appendix 18

LNK Industries questionnaire validation

Name C
 Age 44
 Position project manager
 Department construction department
 Experience in i 22
 Education engineer

#	Factors affecting corporate agility	Organization's level of agility										notes
		1	2	3	4	5	6	7	8	9	10	
	Human Resources	5.9										
1	Ignorance of personnel: needs, suggestions, aims etc. ("1" – we became a social entity , "10" – company does not know that it employs human beings)							7				
2	Impersonal relationship ("1" - we are a family, "10" – I do not know names, only job titles)					5						
3	Training and studying ("1" – we do not study at all, "5" balanced programs are developed in cooperation with the respective department-, "10"- never ending training)					5						
4	Employees' valuation scheme ("1" – does not exist, "10" - very detailed and comprehensive)					5						
5	Complexity of testing procedures for the employees ("1" – clear and simple, "10" – mission impossible)					5						
6	Implementation of employees ideas/opinions ("1" – always implemented, "10" – totally ignored)								8			
7	Alignment of employee's personal goals and corporate goals ("1" – fully aligned, "10" – we aim at different galaxies)							7				
8	Trust in direct manager ("1" – he/she is my guru, "10" – egocentric betrayer)						6					
9	Clear career tracks for employees ("1" - I do not know what I'll do tomorrow, "10" – I know my track for the next 10 years)							7				
10	Previously agreed remuneration/penalties ("1" - the amount of my salary surprises me each month "10" – I know the amount of my salary for the next 10 years)				4							
	Communication incl. reputation	5.71										
11	General reputation of the company ("1" –the best company to work for, "10" – monster)						6					
12	Open and frank internal communication ("1" – highly supported, "10" – CEO knows better)					5						
13	Open and frank external communication with clients, subcontractors and stakeholders ("1" – highly supported, "10" – CEO tells us what to say)						6					

14	Tolerance of discrimination on any basis (race, gender, sexual, cultural, religious or political background) ("1" – discrimination is totally avoided, "10" – paradise for discriminators)				4								
15	Level of trust and openness between company and its employees ("1" – complete trust, no secrets, "10" – no trust)								6				
16	Level of trust and openness between company and its clients, subcontractors and stakeholders ("1" – complete trust, no secrets, "10" – no trust)								6				
17	Involvement in charity activities ("1" – not involved at all, "10" – we became a charity fund)									7			
	Operational planning and approach								6				
18	Professional approach of the company ("1" – any project can be implemented, "10" – we build only boxes according to highly detailed drawings)									7			
19	Professional level of my department/team ("1" – we are gods, "10" – the people around me were selected randomly)				4								
20	Level of paper work (reports, inquiries, explanation notes etc.) ("1" – we do not do any paper work at all, "10" – I cannot perform my direct duties due the paper work I have to manage)									7			
21	Operation according to previously set plans and forecasts ("1" – We do not know what we'll do tomorrow, "10" – we have daily plans for the next 10 years)								6				
22	Your superior plans the work ahead, evaluating few potential scenarios. ("1" – we start solving problems a year after their appearance "10" – yes, we have a plan even for the case of invasion of aliens.)								6				
	Management and Organizational behavior								6.5				
23	Resistance to change ("1" – we are a jelly, "10" – we are a rock)								6				
24	Time needed to make a decision ("1" – everything is done on the spot, "10" – never ending story)										8		
25	Internal focus – minimization of external interruption ("1" – we are open for critics and advises, "10" – everything is decided in-house)											9	
26	Time needed to implement a decision/change ("1" – everything is done on the spot, "10" – never ending story)					5							
27	Level of internal inertia ("1" – everything is done on the spot, "10" – nothing happens)									7			
28	Cooperation between departments and mutual assistance ("1" – we are one team and have one big aim, "10" – other departments only ruin my work)									7			
29	Consequences of quick implementation of decisions/changes ("1" – we are in nirvana, "10" – quick changes ruin company)				4								
30	Focus on corporate command-control system ("1" – we do what we want, "10" – we are told what to do)								6				
	Structure and Corporate governance								5.11				

62	ENVIRONMENTAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis "10" –the last environmental challenge affected our company was an extinction of dinosaurs)					5						
63	LEGAL changes frequency occurrence and their influence on your company. ("1" – yes, we adjust our activities on daily basis, "10" – the last legal challenge affected our company had happened a century ago)			3								
	General valuation					5.2						
64	Overall organizational behavior ("1" – super fair and agile, "10" – super unfair and bureaucratic)					6						
65	Overall organizational stability and development ("1" – super unstable and developing, "5" stable and developing "10" – stable stagnation)					6						
66	Overall level of bureaucracy ("1" – super agile, "10" – super bureaucratic)					6						
67	Employees' overall level of satisfaction ("1" – paradise, "10" – hell)				4							
68	Individual level of satisfaction with the work for the company ("1" – paradise, "10" – hell)				4							



Jevgenijs Locovs was born in 1981 in Riga. He received a Bachelor's degree (2007) and a Master's degree (2009) in Civil Engineering from Riga Technical University, and an Executive Master of Business Administration (2011) from Stockholm School of Economics in Riga. From 2011–2020, he has been a Board member of JSC LNK Industries, and from 2020, he has been a member of the steering committee of JV BSL INFRA. His research interests are related to construction industry.