

Innovative Performance Measurement Systems in Kazakhstan Construction Industry

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ABSTRACT

Most problems in nowadays of any project is linked with problems in measurement of performance in construction. Many failures in Kazakhstan construction industry occur because of absence of workable performance measurement system. Increasing competition between construction firms and changing demand of the type of the construction projects also need a feasible performance measurement system. Accordingly, nowadays a need for a comprehensive performance measurement system has been identified for construction organizations. The main purpose of this research is to analyze performance measures and propose an appropriate model of framework for the construction industry of Kazakhstan.

This research was performed in Atyrau city, Western Kazakhstan. Most of the construction firms contacted were local. All collected data was carried out throughout a questionnaire and seventy three (73) respondents participated in this study. Owners, managers and employees in this research were requested to rate the most significant key performance indicators. According to this study, Relative Importance Index (RII), T-test and the Correlation analysis and Factor Analysis were used to identify the difference in perceptions between respondents.

The results of this study show that, the most ten (10) important key performance indicators (KPIs) agreed by the owners, managers and employees were: cash flow, training of staff, profitability, construction cost, productivity, time for construction, quality of service and work, quality of product, business efficiency and finally customer satisfaction – product.

The outcome of this research displays that construction companies should implement performance measurement systems to assess their existing status. This research facilitated to understand the actual performance challenges in Kazakhstan construction industry.

Keywords: Kazakhstan, Construction Industry, Performance measurement systems, Key performance indicators (KPIs)

ÖZ

Günümüzde gerçekleşen herhangi bir projedeki problemlerin çoğu yapımda performans ölçüm sorunları ile bağlantılıdır. Kazakistan inşaat sektöründe yaşanan birçok başarısızlıklar uygulanabilir bir performans ölçüm sisteminin olmaması nedeniyle oluşmuştur. İnşaat firmaları arasındaki artan rekabet ve inşaat projelerinin çeşitliliği nedeniyle değişen talep de uygulanabilir bir performans ölçüm sistemini gerektirir. Buna göre, günümüzde inşaat firmaları için kapsamlı bir performans ölçüm sistemine ihtiyaç olduğu tespit edilmiştir. Bu araştırmanın temel amacı, Kazakistan inşaat sektöründe performans ölçütlerini analiz etmek ve uygun bir model çerçeve sunmaktır.

Bu araştırma Batı Kazakistan'da bulunan Atyrau şehrinde gerçekleştirilmiştir. İletişime geçilen inşaat firmalarının çoğu yerel firmalardır. Tüm veriler bir anket aracılığı ile toplanmıştır ve yetmiş üç (73) katılımcı bu çalışmaya dahil edilmiştir. Bu çalışmada mal sahipleri, yöneticiler ve mühendislerden en önemli anahtar performans göstergelerini (APG) değerlendirmeleri istenmiştir. Bu çalışmada, Bağlı Önem Endeksi (BÖE) göre, T-testi ve korelasyon analizi katılımcıların arasındaki algı farkını tanımlamak için kullanılmıştır.

Bu çalışmanın sonuçları mal sahipleri, yöneticiler ve mühendisler tarafından kabul gören en önemli on (10) anahtar performans göstergelerini (APG) işaret etmektedir: nakit akış, personel eğitimi, karlılık, inşaat maliyeti, üretkenlik, inşaat süresi, hizmet ve iş kalitesi, ürün kalitesi, iş verimliliği ve son olarak müşteri memnuniyeti.

Bu arařtırmanın ıktıları, inřaat firmalarının mevcut durumlarını deęerlendirmek iin performans lüm sistemlerini hayata geirmeleri gerektięini göstermektedir. Bu arařtırma, Kazakistan inřaat sektöründeki fiili performans zorluklarını anlamayı kolaylařtırmıřtır.

Anahtar Kelimeler: Kazakistan, inřaat sektörü, performans lüm sistemleri, anahtar performans göstergeleri (APG)

To My Family

ACKNOWLEDGMENT

First of all, for all splendid support, guidance and recommendation I'm appreciate my supervisor and mentor Assoc. Prof. Dr. Ibrahim Yitmen. Infinitely I am grateful to my parents and brother for their boundless faith in me, their inspiration, their support throughout my life and love. For this I would like to dedicate this thesis to them.

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Chapter 1

INTRODUCTION

1.1 Background of the Study

Recent researches described that construction innovation proposal is a dormant benefit for the industry, organization and society. Although a commonly declared sense of the construction industry standpoint novelty as an uncommon entry, in fact it happens consecutive all over the industry segments (Dinner and Lerner 1992; Slaughter 1993a; Johnson and Tatum 1993). On the other hand, organizations within the limits of the industry are concerned in innovational methods and plans, which refers to systems, equipment, details, technique, administration, or other associated origins.

Construction-associated innovation has considerable public profit (Seaden 1996). Supposing the construction facilities cost is decreased, the facilities turn affordably more, therefore, still available to a high proportion of the population. Nowadays, betterment in the effectiveness of residential construction to cure the high-class of life for townsman is a main focus of any construction plans. Equally, also reducing the influence of environment of activities related to construction with novelty gives social advantages and benefits regionally, as well as worldwide (Sarah Slaughter, 1998). Notably, the workability of technique of construction enterprise is increased by innovation.

The fresh leads and plans for the enhancement of projects and construction itself are different. Bassioni (2008) argued that throughout the confidence of performance measures the industry of construction performance could be superior recognized. That author designed an advantage sample which is anticipated to maintain performance of benchmark.

Nowadays, the performance of construction industry is a required component in the management of construction system. It prepared the needful data and intelligence for operation management that makes it capable to establish set and workable aims. There is needful to maintain business strategies of performance. It is no news that the construction itself has a great part in improvement and enhancement of the public (Butcher & Sheehan, 2010).

In his study, Navon (2005) agreed that the construction is having a ten percent of the gross national product among the greater industries in the world. This construction field makes it more complicated with stakeholders (Crespin-Mazet, 2015). Within the construction, according to many authors the performance have always been interested by every scientist or scholar (Eccles, 1991; Egan, 1998; Kaplan & Norton, 1996).

Kazakhstan is a developing country, with all sparse and rare natural resources, and all roots of Mendeleev's Table. The country often depends on foreign support from developed countries, to meet countries national budget. Since the cast in Kazakhstan a government program of forced industrial-innovative development in 2013, production in the national construction industry was increased by more than twice. In Kazakhstan, there are more than 350 thousand legal entities (small and medium

enterprises, large companies,). Among them there LLP, SA, branch offices, public segments and private firms. Of the 52,978 registered construction companies active in Kazakhstan at the moment is 28,599. There are different regulatory mass to control the safety adherence and performance of construction firms from all aspects. But for regulations generally are formulated by the Agency of Kazakhstan Republic of Construction and Housing and Communal Service. To guarantee, maintain and support the great quality of all construction norms a management and technical observation is necessary. It is no secret that every time customers, contractors, consultants are requiring a constant enhancement (Stewart, 1997; Watson, &Seng, 2001).

1.2 Key Performance Indicators in Construction Industry

The construction industry, itself is a great and significant supporter of most country's financial economy, because it is one of the most dynamic fields. Example can be as the manufacturing of quality materials. Growth the complication of implementation measurements is coming from engaged associates of the construction projects. Usage of key performance indicators help to avouch the prosperity of construction goals. A lot of authors discussed that a main basic criterion to achieving success is to follow quality, cost and time, and different ones propose the achievement is anything more complicated. Also many of them proposed that cash flow, planning and interrelation between customer and supplier as factors would increase the achievement of construction project. Significant aim of key performance indicators is providing overall measurement and organizational performance via construction (KPI Working Group, 2000).

Measuring of operations that are crucial to success of company or industry itself is a key performance indicator. All over the world, most of large companies in developed countries apply key performance indicators. A major part of any measurement is a providing firms and organizations to use benchmarking.

Methodical and regular operation of comparing and measuring company's performance instead of different company's in crucial business activities. Gathering intelligence and information which are collected may be used to set enhancement aims to advance changes in organizations (KPI, 2000).

1.3 Current Problems in Performance Measurement Systems

This recent year's one reason for lower image of construction industry in society is poor performance management. Most researchers determined this problem that became from inefficiency. If key performance indicators ought to be in the spirit of each system of performance, a lot of companies or entities share no interest of their significance.

In the study, Beatham (2004) stated, for their actual form and pertain to measurement systems, one of the significant issues related to key performance indicators, is no proposal of possibility for change in organization. KPIs are destined to be used as post-result lagging key performance indicators. The leading measures are advised to grand be times notifications. The other problem is a selection of appropriate indicators for organizations because nowadays there are a lot of KPIs. The bad attitude comes from managers or administrative who only choose the elementary KPIs that anyone using. Another deadly example are entities or organizations that do not know how to use KPIs to evaluate their status.

In Kazakhstan, only large construction firms and companies had implemented KPI. Many of small and medium-sized companies do not use KPIs. The quality of their work and performance is upper-middle. Collaboration with cosmopolitan companies in construction can enhance procedures in Kazakhstan, coming from the growth of development of the management operations, choosing modern equipments, client's gratification and income.

1.4 Objective of Research

The purpose of this study is to develop a conceptual framework model that focuses on the improvement of performance measures in Kazakhstan construction industry.

The main objective of this study is to:

- Identify the right KPIs that affect the working process in construction industry of Kazakhstan.
- Assess the existing performance measurement system in construction industry of Kazakhstan.
- Develop a conceptual framework of improving performance measures in Kazakhstan construction industry.

Moreover, the study contains an extra literature researches and review conducted with masters within the industry to identify and think over performance measurement factors.

1.5 Limitations of research

The collection of all data, information, and intelligences is one of the deepest issues in this research. Mainly it has been gathered online from the construction companies operating in Kazakhstan construction industry. On the other hand, the quantity of respondents to some extent is less and only suitable and appropriate for Kazakhstan construction industry.

1.6 The Structure of Thesis

This research consists of five chapters. The first chapter introduces the background of the study, the formulation of the problem, research limitations and the research objectives. The second chapter contains the theoretical overview which describes the review of the crucial components affecting the performance of construction industry. The third chapter defines the methodological approach of the study and discusses the most applied methods to develop the performance measurement model in prior researches. The fourth chapter presents the results, explains the type of analysis conducted, and discusses the findings. The fifth and last chapter finally concludes the overall and study with the most significant findings and proposes recommendations for the study and the further research.

Chapter 2

LITERATURE REVIEW

2.1 Performance Measurement Systems in Construction

Innovation is the development, commercialization and idea of mainly new products, services or businesses providing the development of new sources of competitive advantage (“Innovative Performance measurement”, 2013). On the other hand, the operational and strategic goal in the internal process perspective on the organization-wide strategy map is innovation (Balanced Scorecard Institute, 2000).

A big and great concern for private and public sector is construction performance (Okuwaga, 1998). Wegelius-Lehteonen (2001) says that the measurement of performance is a actual subject which is popularly discussed and considered in academia and business. In their study, Karim and Marosszeky (1999) agreed by saying that with the help of current available KPIs, the performance of construction could be estimated and evaluated. According to He et al., (2015) these are satisfaction of customer, overall quality, construction cost, time, health and safety and performance of business. By using these factors, construction project success and index of performance can be benchmarked (Lu, Peng, & Shen, 2015). Nandhinipriya and Kowsalya (2015) also argued that regular and systematic method of estimating both output and input in operations of constructions is performance measurement and operates as an instrument for constant enhancement and provides a sense of where they are.

Other studies (Sink and Tuttle, 1993; Neely et al. 1995) argued that performance measurement and benchmarking, in particular, have played an important role in other sectors companies, providing essential information for planning and control of management processes. It follows that the achievement of performance measurement and benchmarking, through KPIs, can represent a substantial help for professionals in construction industry, giving them the ability to provide products and services with the best relation quality/benefit, which will be recognized by its customers, and simultaneously allowing them a more efficient monitoring of construction projects, contract management and performance evaluation of the entities involved.

According to Bassioni et al. (2004), the unchallengeable part of management is performance measurement since the existence of management. From the 20th century, introducing the return of investment (ROI) measure, many of the financial performance techniques and methods were used (Neely et al., 2000, Kaplan, 1984, Chandler, 1977). After a long term dependency on measurement of financial, accordingly to Keegan et al.'s (1989), classification of performance can measure cost and be advanced by matrix of performance. On the other hand, Maskell (1989) agreed that the flexibility, time and overall quality is measured by performance measures. In their study, Cross and Lynch (1989) prescribed a relation through the main criteria of performance (performance dimensions) which is depicted in performance pyramid.



Figure 1: “The Performance Pyramid” by Cross and Lynch (1989)

The significance of identifying the performance of organization is known completely by the global markets, to increase share value and attraction of high skilled employees and hereafter investment. That’s why, the communication with a broader market and how to measure performance of organizations is significant. According to Chandler (1997) importance and significance of formulation of performance indicators which get further have been in procedure from the start of our century.

2.1.1 The Balanced Scorecard

The Balanced Scorecard (BSC) was first introduced by Kaplan and Norton (1992), and is widely appreciated by many companies and reviewed by researchers as a strategic management study in developing a performance management system. It has been recognized that the traditional financial measure does not figure out an organization’s future performance as financial measures are laggard indicators aimed

at past performance. The BSC attempts to provide the relevant information about activities which are currently managing than that of which is provided by financial measures by including non-financial measures. Harvard Business Review has qualified the BSC as one of many important authoritative factor of business notion of the past 75 years.

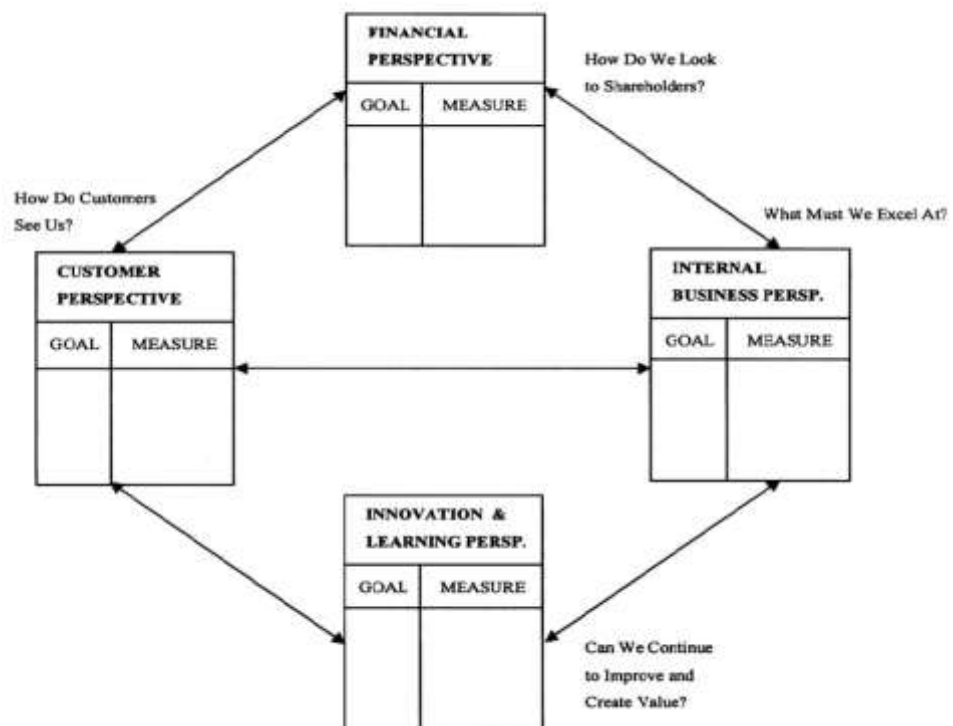


Figure 2: “The Balanced Scorecard” (Kaplan and Norton, 1992).

According to (Pho and Toong, 2012) all four perspectives of BSC with a sturdy accent on Learning & Growth are covered by strategic thrusts and critical success factors.

2.1.2 EFQM Excellence Model

With important relationship to quality, ‘Excellence Models’ began appear to represent a holistic approach of management framework exercise and to assistance organizations to concentrate on diversity of evaluation and analytical criteria (Goasdoue, 2001).

According to Slatkeviciene and Vanagas (2000), as viewed the “Business excellence” by many of complex determinations is of European Foundation for Quality and Management Excellence Model (EFQM). “The true great organizations which try to make satisfaction for their stakeholders by their achievements, how they achieve it, what to achieve and the confidence sustained in the future” (EFQM, 2005). In their study (Adebanjo, 2001), determination is based substantially on the idea and concept of total quality management (TQM). Business organizations and Public Authorities in Europe are committed to make better performance via the quality techniques progress. An important purpose that they try to reach and make success in this endeavor is business excellence model. This concept is derived on prerequisite that impact of people and satisfaction of clients are collected via strategy of moving leadership, people processes and leading management finally to excellence in business result.

The model is good thought of the results and process balance. Actually it took significance on handling facilities, technology and partnership, which are of the main worry is the absence of full monitor on prevention and teamwork (Kanji, 2002).

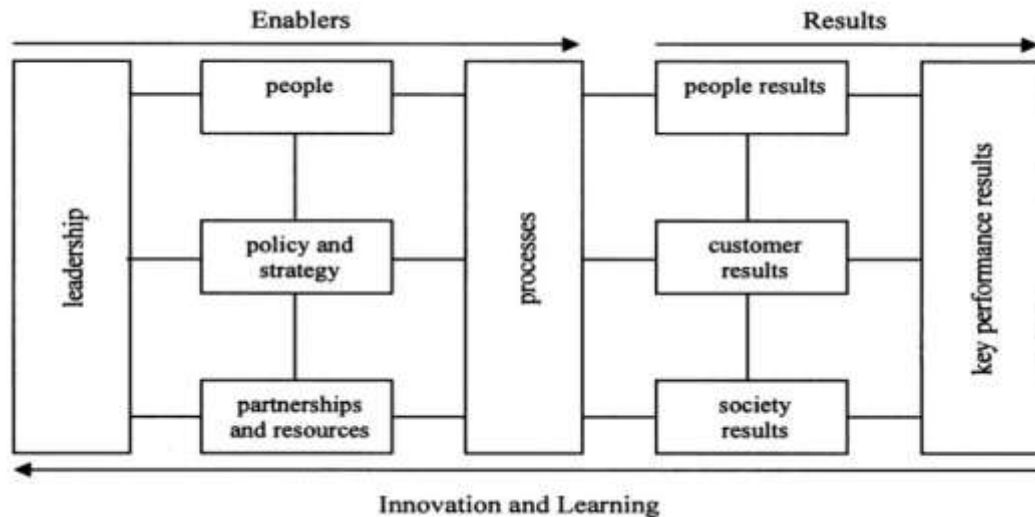


Figure 3: The EFQM Excellence Model (Slatkeviciene and Vanagas, 2000)

All nine elements are criterion that could be used to evaluate the progress of organization towards excellence. Each criterion specifies the whole significance of the criterion in deposit to success of business. The scope of results and degree of excellence score every single part of a result. A general study of overviewed performance of frameworks and conceptual model indicate the following:

1. Limited/non-comprehensive performance criteria/ perspectives;
2. No relations among criteria, or if relations exist, they are simple and do not simulate actual complexities;
3. No measures development and design process;
4. Lack of implementation guidelines and long-term maintenance of the framework to adapt to the changing environment;
5. Little consideration for existing performance systems and their interaction with the model/framework.

2.2 Kazakhstan's Construction Industry

The construction industry in Kazakhstan is growing steadily, and new research from the country shows why. There has been an increase in new buildings being constructed, which is allowing firms to make profit from an improving market and an increased need for labor and construction materials. Kazakhstan's construction sector is expected to continue to improve in 2014, continuing its rebound after the 2008-2009 global economic crises. There are residential, office, commercial and multi-functional projects developing in Astana, Almaty and Atyrau. In addition, large infrastructure and industrial projects are planned for Western Kazakhstan. The construction sector significantly influences the national economy as well as social judgments. Further developments of the industry, improvements in safety, and updates in the quality of construction products are key economic and political tasks of the government. In recent years, economic growth in Kazakhstan had a positive effect on the development of the construction industry. One of the most rapidly growing sectors is the construction of residential buildings.

In 2010, the Government of Kazakhstan approved the Accelerated Industrial Innovation Development Program 2010-2014 (AIIDP), a major strategy of economic development aimed to stimulate industrial innovation in various sectors of Kazakhstan's economy. The construction industry is one of the priorities. The main goal of the AIIDP is to achieve a sustainable diversification of the economy as well as to increase its competitiveness in the long-term. According to the AIIDP, project financing will be provided from the state budget, commercial banks, and international financial development institutions. Improvement in Kazakhstan's overall economic situation, growth of the real estate and construction sectors, and the

restructuring of the housing industry have stimulated demand for building equipment and materials as well as for architectural, construction and engineering services. There is a growing demand for all types of construction services. For example, construction, renovation, and conservation of industrial and public utilities and residential buildings are all much needed. Also, architectural, design, engineering and assembly services are in demand. In addition, there is a need for a full range of civil engineering, including: research and development, all aspects of design, design and build, management contracting, and construction management. There are residential, office, commercial and multi-functional projects developing in Astana, Almaty and Atyrau. In addition, large infrastructure and industrial projects are planned for Western Kazakhstan.

Less than half of the construction materials used in Kazakhstan is produced domestically. Locally produced materials include cement, bricks, wooden doors, windows, steel doors, and soft and iron roofs. A fairly high portion of locally produced materials and products are not considered to be up to international standards. Most other materials are imported, mainly from Turkey, China, Germany and Russia. While the oil and gas sector will be the major purchaser of architecture, construction, and engineering services for years to come, there is demand for these services in many other sectors. These include construction, renovation, and conservation of residential buildings and industrial and public utilities, as well as design and assembly services. There is a need for the full range of civil engineering, construction, and engineering activities including research and development, all aspects of design, design and build, management contracting, construction

management, tunneling and tunnel lining, foundation engineering, mining, and facilities management.

2.3 KPI in Construction Industry

According to Mladen Vukomanović, (2010), the basic cause of poor practice that construction industry has nowadays is the bad management. However key performance indicators must be in a core of all systems of performance. According to Edwards and Thomas (2005), collection of intelligence for evaluating the performance and measurement are performance indicators.

Performance measurement is a great system of business improvement. To achieve efficient system, managers should have a balanced set of performance indicators (Beatham, 2005; Kaplan and Norton, 2001).

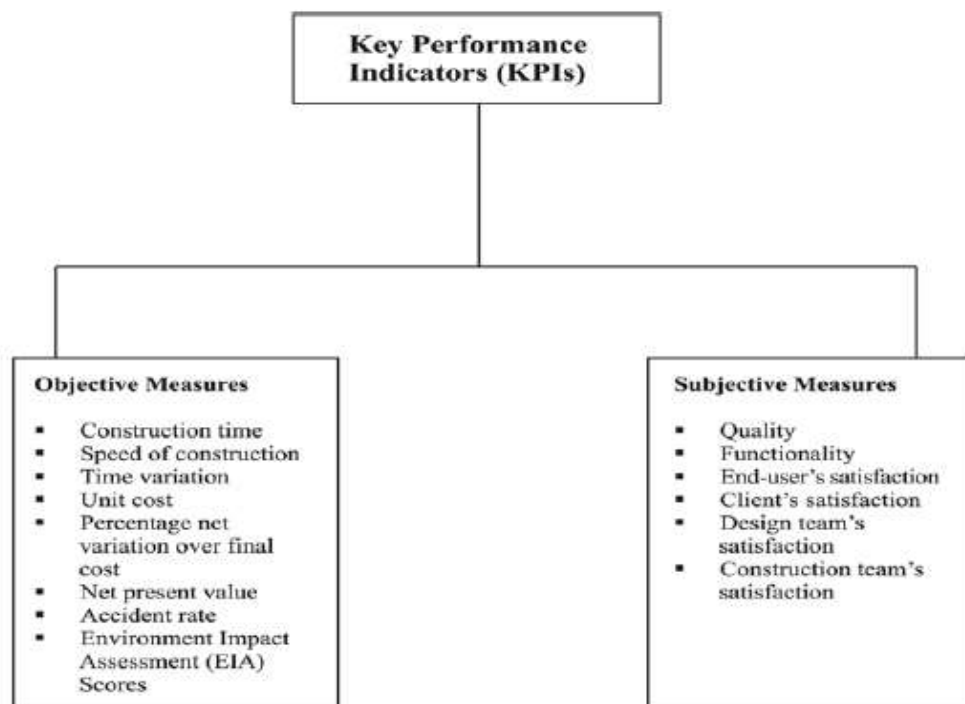


Figure 4: Key Performance Indicators for Project Success

KPIs are used as means of communication within stakeholders to inform them about permanent enhancement endeavors. The construction excellence working group, the largest performance association in UK, determined KPIs: *“A Key Performance Indicator (KPI) is the measure of performance of an activity that is critical to the success of an organization”*. According to Cox et al., (2003) the compilation of all intelligence and information measures which are used to evaluate the construction performance are KPIs. KPIs perform an important part in providing data on the tasks of construction performance. Kaplan and Norton (1993) showed that KPI in different countries has its difference. All the possible circumstances as policies, cultures, markets require unique measures. Summary of available early studies on indicators of performance are presented in table 1.

Table 1: Summary of available early studies on indicators of performance

No.	Author and year	Country	Performance indicators
1	Jastaniah (1997)	Saudi Arabia	1. Client satisfaction 2. Planning period 3. Staff experience 4. Communication 5. Safety 6. Closeness to budget 7. Profitability 8. Payment 9. Claims
2	Egan (1998)	UK	1. Predictability – time, cost 2. Construction cost 3. Construction time 4. Productivity 5. Profitability 6. Safety 7. Defects 8. Client satisfaction
3	Department of the Environment, Transport, and the Regions (DETR), 2000 Department of the Environment, Transport, and the Regions (DETR) (2000)	UK	1. Time 2. Cost 3. Quality 4. Client satisfaction 5. Client changes 6. Business performance 7. Health and safety
4	Pillai et al. (2002)	India	1. Benefit 2. Risk 3. Project status 4. Decision effectiveness 5. Production 6. Cost effectiveness 7. Customer commitment 8. Stakeholders 9. Project management
5	Cheung et al. (2004)	China	1. People 2. Cost 3. Time 4. Quality 5. Safety 6. Client satisfaction 7. Communication 8. Environment
6	Wong (2004)	UK	1. Staff experience 2. Resources 3. Site management 4. Safety 5. Contractor experience 6. Time 7. Cost 8. Quality
7	Constructing Excellence (2005, 2006, 2009) and Roberts and Latorre (2009)	UK	1. Client Satisfaction 2. Defects 3. Predictability cost, time 4. Construction cost, time 5. Variance cost, time 6. Contractor satisfaction 7. Profitability 8. Productivity 9. Safety 10. Social indicators 11. Environment
8	Rankin et al. (2008) and Canadian Construction Innovation Council (CCIC) (2007)	Canada	1. Cost 2. Time 3. Quality 4. Safety 5. Scope 6. Innovation 7. Sustainability 8. Client Satisfaction
9	Luu et al. (2008)	Vietnam	1. Construction cost 2. Construction time 3. Customer satisfaction 4. Quality management 5. Team performance 6. Change management 7. Material management 8. Safety
10	Skibniewski and Ghosh (2009)	USA	1. Construction cost 2. Construction time 3. Predictability cost and time 4. Defects 5. Client satisfaction product
11	Toor and Ogunlana (2010)	Thailand	1. On time 2. Under budget 3. Specifications 4. Efficiently 5. Effectiveness 6. Safety 7. Defects 8. Stakeholders 9. Disputes
12	Construction Industry Institute (CII) (2011)	USA	1. Cost 2. Schedule 3. Changes 4. Accident 5. Rework 6. Productivity

KPI is the measure of performance that is critical to the success of an organization (Swan and Kyng, 2004). The construction industry KPIs were first published in 1999, and are updated annually. Many organizations use KPIs. There are a number of performance measures that define the success of a project or organization.

Table 2: The headline KPIs, by Rethinking Construction (5-6-10 model)

Name	Description	Type – What measured?
Construction Cost	Improvement of capital cost year on year	Project
Construction Time	Improvement of capital cost year on year	Project
Predictability Cost	Actual cost against the cost predicted at tender	Project
Predictability Time	Actual time against the time predicted at tender	Project
Client Satisfaction Product	Client satisfaction with the delivered product	Project
Client Satisfaction Service	Client satisfaction with the service provided by the Project Team	Project
Defects	Impact of the defects of the final product	Project
Productivity	Value added per person working on the project	Project
Profitability	Profitability of the Construction Company	Organisational
Safety	Accidental Incident Rate for the Company	Organisational

2.3.1 Benchmarking and Performance

According to Ljubo Marković (2011), benchmarking is a business approach devoted to area of strategic or operational planning, financial management, marketing, restructuring and a practice to "learn from the best". Benchmarking is, searching for the top practices in industry that guide to manufacture more admirable performance. It is also the research and observation of the top practice of competitors and/or search for the top industry practice leading to producing the more admirable performance (Camp, 1989).

Benchmarking is usually a process reengineering or quality improvement initiative (Reh, 2006). Benchmarking is defined by Wikipedia (2007) as “a process used in management and particularly strategic management, in which organizations check

various aspects of their processes in relation to best practice, usually within their sector.”

According to Swan (2004), benchmarking is the method of improving performance in a systematic way by measuring and comparing one’s performance against others, and then using lessons learned from the best to make targeted improvements.

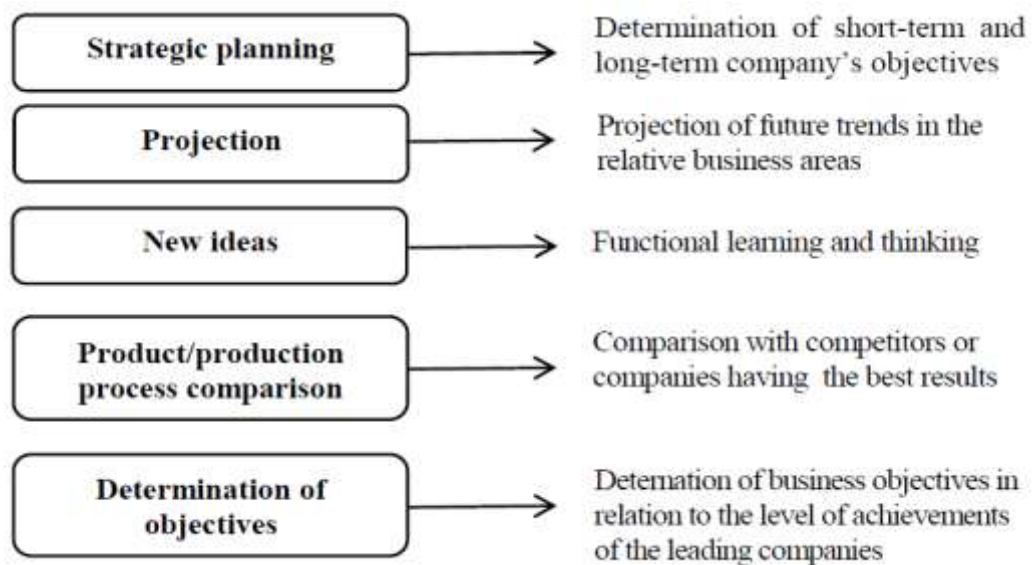


Figure 5: Fields of benchmarking application (Source: Spendolini, 1992)

Tolosi (2000) defined that benchmarking is the process in which the products, services and operational practices of a given organization are continuously measured, which is compared with performance of organization. Benchmarking is a fine development instrument, in as much as enforce a self-critical approach, that shows the main paragraphs of any operation the organization has to refine. According to Li et al (2001), the goal for reaching partnering excellence, cooperative benchmark is necessary. In their study, Chan and Chan (2004) agreed that search of best practices which conduct the excellent performance is determined as benchmark.

On the other hand, Grigoroudis et al (2006) stated that in order to define all sides of organization whether strong or weak, identification of the disadvantages and advantages and enhancement priorities a benchmark approach could be used.

2.4 Implementation of KPI

In their recent research, Bassioni et al. (2005) derived that a detailed implementation and scoring technique is needed to be developed for a PMS at the company level.

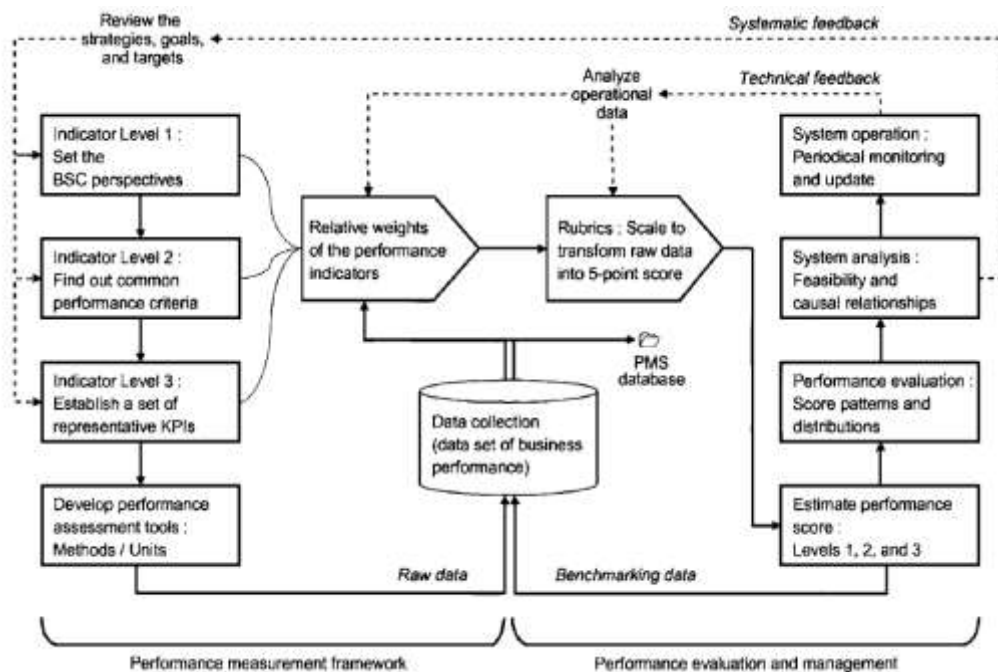


Figure 6: Implementation model of a PMS (Bassioni et al. 2005)

As shown in the above figure, the implementation model includes:

- Framework of performance measurement
- Management and evaluation of performance

The framework of performance measurement consists of BSC perspectives, assessment ways, representative KPIs, and relative weightings. Management part and evaluation of performance assess the score using framework of performance measurement.

According to Eccles (1991), from his experience of working with organizations implementing performance measurement systems, there are three important factors for the successful updating of a performance measurement system:

- Developing an information architecture with supporting technology
- Aligning incentives with the new measurement system
- The lead given by the CEO.

According to UK Construction Consultants (2008), there are 7 steps to Implementing KPIs.

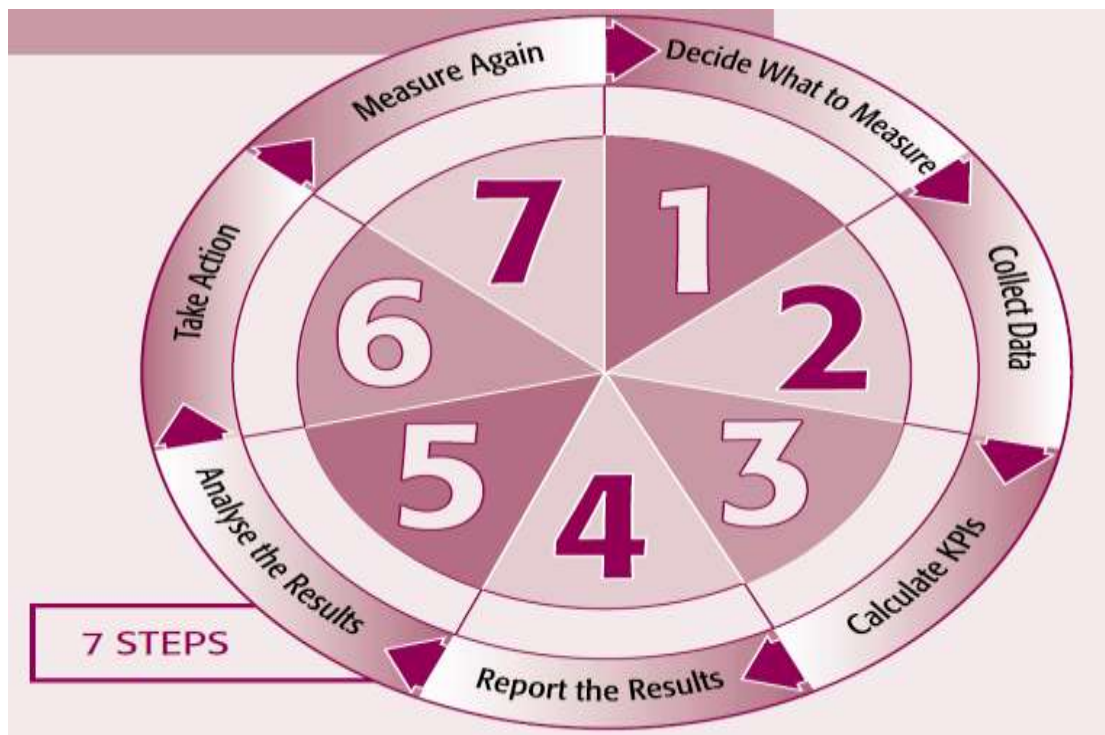


Figure 7: 7 Steps to Implementing KPIs. UK Construction Industry

Following the 7 step process will help define which KPIs to use, how to roll up and manage the information and how to report the results.

- 1- Decide what to measure
- 2- Collect data
- 3- Calculate KPIs
- 4- Report the results
- 5- Analyze the results
- 6- Take action
- 7- Measure again

Step 1: Measurement that should be decided

Importance of steps is the determination of measures. Commonly, two perfect rules are:

- Importance of measurements suitable for Company
- Importance of measurement suitable for Customer

Step 2: Collection of Data

Commonly, all information should be gathered from two springs – a records that is existing now and newly introduced. On a consultants and clients lies a duty for ensuring information and data for the KPIs.

During this process, it is important to know:

- All data should be gathered and collected separately from different companies
- All records should be done truly. Not all, but most of issues cannot be in your regulation.

- All comments should be gathered with a data. Necessary to know how and why it is, if a customer's level of satisfaction is too low.

Step 3: All KPIs need to be calculated.

Importance of knowing the decisions for Benchmark. Before to start measure all KPIs, it is necessary to know what should be compared. In United Kingdom all data are promulgated in the Construction KPI Wall chart and can be measured the score of benchmark.

Step 4: Report Results

Once the score is determined, it is important to notify others. A proper way to make it is to putting all data in the radar chart, contained on per wall chart. In UK are commonly used:

- Radar Chart – it shows the whole picture of any performance of benchmark of organization. That kind of chart is very well and simple for result presentation of set of KPIs.
- Graphs - for each appropriate KPI. To present and report a results of single and individual KPIs all over the time, a line graphs or bar charts are so suitable.

Step 5: Analyzing all results

The linkage between all different scores of benchmark should be noticed. If profitability score is linked with customer satisfaction's low level, it somehow may show for make a profit the corners are cut.

Step 6: Take Action

Too many organization's stop in analyzing the results that shows no benefit of usage data of benchmark to some enhancement.

Most important things:

- Escape some strategies that enhance one by costs of another.
- Any improvements and enhancement take time, and can involve activity between customers and consultants.

Step 7: Continuous measurement

The main challenge for achieving high levels of quality and performance is the use of KPI constantly. One-time use of KPI is no advantage in general. According to many researches, The United Kingdom of Great Britain has a long and great history of usage KPIs in the Construction Industry. The appearance of Construction Industry KPIs is associated with the Department for Business, Enterprise & Regulatory Reform (BERR or DTI), Building Cost Information Service , Health and Safety Executive, and of course with Constructing Excellence using data from BERR (Construction Excellence, 2009).

In general, KPI are gathered and collected annually. Nowadays it has been divided into three important groups, namely: Economic KPI, Respect for People KPI, Environment KPI.

2.5 Review of KPIs in Different Countries

2.5.1 United Kingdom

According to the Egan Report, (1998), and Latham Report (DOE, 1994), the own set of key performance indicators were developed and improved by the UK construction industry to measure performance.

According to DETR (2000), every customer within construction industry always wants that project should be delivered: on time, without any defects, effectively, securely, within the budget and provided by lucrative companies.

Framework of Key performance indicators (KPIs) is consisted of seven important groups: Time, Cost, Quality, Client Satisfaction, Client Changes, Business Performance, Health & Safety.

In their study DETR (2000), depending on the indicators in matter, these indicators should be attached to company or project level:

- Headline Indicators afford the whole measure, status and condition of a firm.
- Operational Indicators concern on significant sides or aspects of activities of company and have to allow management to recognize and concentrate in areas of enhancement.
- Diagnostic Indicators shows data and intelligence of possible changes and their reasons of how they could happen and occur in the operational or headline indicators. Also diagnostic indicators are helpful in analyzing zones for enhancement in most detailed version.

Table 3: The KPI Group and their connected indicators

Time	1. Time for Construction	Headline
	2. Time Predictability - Design	Headline
	3. Time Predictability - Construction	Headline
	4. Time Predictability - Design & Construction	Operational
	5. Time Predictability - Construction (Client Change Orders)	Diagnostic
	6. Time Predictability - Construction (Project Leader Change Orders)	Diagnostic
	7. Time to Rectify Defects	Operational
Cost	1. Cost for Construction	Headline
	2. Cost Predictability - Design	Headline
	3. Cost Predictability - Construction	Headline
	4. Cost Predictability - Design and Construction	Operational
	5. Cost Predictability - Construction (ClientChange Orders)	Diagnostic
	6. Cost Predictability - Construction (ProjectLeader Change Orders)	Diagnostic
	7. Cost of Rectifying Defects	Operational
	8. Cost In Use	Operational
Quality	1. Defects	Headline
	2. Quality Issues at Available for Use	Operational
	3. Quality Issues at End of Defect Rectification Period	Operational
Client Satisfaction	1. Client Satisfaction Product - Standard Criteria	Headline
	2. Client Satisfaction Service - Standard Criteria	Headline
	3. Client Satisfaction - Client-Specified Criteria	Operational
Change Orders	1. Change Orders - Client	Diagnostic
	2. Change Orders - Project Manager	Diagnostic
Business Performance	1. Profitability (company)	Headline
	2. Productivity (company)	Headline
	3. Return on Capital employed (company)	Operational
	4. Return on Value Added (company)	Operational
	5. Interest Cover (company)	Operational
	6. Return on Investment (client)	Operational
	7. Profit Predictability (project)	Operational
	8. Ratio of Value Added (company)	Operational
	9. Repeat Business (company)	Operational
	10. Outstanding Money (project)	Operational
	11. Time taken to reach Final Account (project)	Operational
Health and Safety	1. Reportable Accidents (inc fatalities)	Headline
	2. Reportable Accidents (non-fatal)	Operational
	3. Lost Time Accidents	Operational
	4. Fatalities	Operational

United Kingdom, as mentioned above, has a big history in usage of KPIs in the construction industry. Customers and simple users always have a right to see and find any intelligence from main website, www.kpizone.com, where are methods of measurement, all examples of chart and graphs, their methods of implementation, all data collections for each key performance indicator.

According to UK Industry Performance Report (2015), and Construction Excellence (2009), every year, there are comings and collecting of new data of KPIs, and as mentioned above it was divided into three main and important groups; Economic KPIs, Respect for People KPIs and Environmental KPIs.

Economic KPIs is sorted into the ten groups:

The Economic KPIs are established as a family tree. At the headline level, the 'All Construction' KPIs conclude intelligence from the all the main construction industry sectors:

- Client Satisfaction - Product
- Productivity
- Client Satisfaction – Service
- Safety
- Profitability
- Defects
- Cost Predictability (Project, Design, Construction)
- Cost
- Time Predictability (Project, Design, Construction)
- Time

The next group is “Respect for People KPIs” including ten main zones of public Performance in the construction industry:

- Employee Satisfaction
- Qualifications & Skills
- Staff Turnover
- Equality & Diversity
- Sick Absence
- Training
- Safety
- Pay

- Working Hours
- Investors in People

The last and no less important group is “Environment KPIs” directs next ten key zones of environmental performance in the construction industry:

- Impact on the Environment – Product & Construction Process
- Energy Use (Designed) – Product
- Energy Use – Construction Process
- Mains Water Use (Designed) – Product
- Mains water Use – Construction Process
- Waste – Construction Process
- Commercial Vehicle Movements – Construction Process
- Impact on Biodiversity – Product & Construction Process
- Area of Habitat Created/Retained - Product
- Whole Life Performance – Product

2.5.2 Saudi Arabia

According to Hany (2012), the most crucial and critical in defining and measuring the success of the company in general and must be established are KPIs, which are suitable for measuring overall performance of construction firms and companies, and application of benchmarking approach.

In their study, Hany and Ibrahim (2012), aimed to determine a set of KPIs that could be performed by construction administrative in evaluating the overall construction efficiency at the company stage in Saudi Arabia.

The feasible key performance indicators that could be apply to assess and compare the performance of construction firms were identified from literature review. On the other hand, (Bannan et al., 2012), agreed that in Saudi Arabia, there are no correct and workable performance systems to evaluate and define the performance of overall construction industry. Most of the local companies and firms have their peculiar method to measure performance, which depend on their aims that are primary main measures that can be appropriate to the organization. The fundamental measures contain over-run cost and schedule that are suitable and applied at the project level. Just only several and most of them large companies and organizations in the Saudi Arabia are applying KPIs.

The Saudi construction industry is presently measured based on the following factors:

- Demand. On the assumption of native population increase, all infrastructure with commercial sector projects and utilities there is a supportable and great demand for construction in Saudi Arabia.

- Government. Administration consumption and spending design, lasting fund are set by administration. It is a measurement key for kingdom of Saudi construction industry performance.
- Opportunities. Possibilities to depositors represent strongly increase and rise for overall construction industry and also are elaborated a performance measurement key.

On the other hand, Hany (2012), argued that the top ranked KPIs were distributed through three perspective namely:

- Financial
- Customer
- Internal business

Their study showed that the financial outlook included four measures: Profitability, growth, financial stability, cash flow. For customer there were indicated three indicators: quality of service and work, external client satisfaction and market share.

The results show that the internal business perspective included three high ranked indicators, namely: safety, business efficiency, and effectiveness of planning.

Perspective	No.	KPIs	Measurement methods
Financial	1	Profitability (Constructing Excellence, 2006; Yu et al., 2007; Bizwiz, 2011)	<ul style="list-style-type: none"> Return on Equity(ROE) = $\frac{\text{Net income after tax}}{\text{Shareholder equity}}$ Economic Value Added (EVA) = (Net operating profit after taxes – money cost of capital) ReturnonCapital(ROC) = $\frac{\text{Net operating income after tax}}{\text{Book value of invested capital}}$ Net Income (NI) = (Total revenue – all expenses) Profitability = $\frac{\text{Profit before tax and interest}}{\text{Total revenues}}$
	2	Growth (Yu et al., 2007)	<ul style="list-style-type: none"> Volume of works growth rate Revenues growth
	3	Financial stability (Yu et al., 2007)	<ul style="list-style-type: none"> DebtRatio = $\frac{\text{Total debt}}{\text{Total assets}}$
	4	Cash flow (Bizwiz, 2011)	<ul style="list-style-type: none"> CashFlow = $\frac{\text{Cashflowgeneratedfromoperations}}{\text{Currentliabilities}}$ Cash Flow = $\frac{\text{Cash flow fromoperations}}{\text{Net income}}$ Cash Flow = $\frac{\text{Net cash flow}-\text{Current portions of long term debt}}{\text{Net cash flow from operations}}$ Cash Flow = $\frac{\text{Cash flow from operations}+\text{fixed cost}}{\text{Fixed cost}}$
Customer	5	Quality of service and work (El-Mashaleh et al., 2007)	<ul style="list-style-type: none"> ReworkFactor = $\frac{\text{Total direct cost of field rework}}{\text{Actual construction phase cost}}$ PAF model = Prevention cost + Appraisal cost + Failure cost
	6	External customer satisfaction (Excellence 2006; El-Mashaleh et al., 2007; Rankin et al., 2008)	<ul style="list-style-type: none"> Percentage of Repeat Customers = $\frac{\text{Number of repeated customers}}{\text{Total number of customers}}$ Customer Satisfaction Survey Number of Complaints
	7	Market share (Yu et al., 2007)	<ul style="list-style-type: none"> MS = $\frac{\text{Company's volume of works in a market(unit)}}{\text{Total volume of works in that market(unit)}}$ MS = $\frac{\text{Company's revenue in a market}}{\text{Total revenue available in that market}}$
Internal business	8	Safety (Excellence 2006; El-Mashaleh et al., 2007; Rankin et al., 2008)	<ul style="list-style-type: none"> Safety Performance = $\frac{\text{Number of reportable accidents in amount of time}}{\text{Average number employed in that time}}$ Incidents Rate = $\frac{\text{Number of recordable incidents} \times 200,000}{\text{Total site work hours}}$ Time Lost = $\frac{\text{Amount of lost time to incidents} \times 200,000}{\text{Total site work hours}}$ Accident Cost = $\frac{\text{Direct and indirect costs to accidents} \times 200,000}{\text{Total site work hours}}$
	9	Business efficiency (Yu et al., 2007; Bizwiz, 2011)	<ul style="list-style-type: none"> Efficiency Ratio = $\frac{\text{Expenses}}{\text{Revenue}}$ Net Profit Margin = $\frac{\text{Net profit after taxes}}{\text{Total revenue}}$
	10	Effectiveness of planning (Excellence 2006; El-Mashaleh et al., 2007; Rankin et al., 2008)	<ul style="list-style-type: none"> Predictability Cost = $\frac{\text{Actual cost}-\text{Anticipated cost}}{\text{Anticipated cost}}$ Predictability Time = $\frac{\text{Actual time}-\text{Anticipated time}}{\text{Anticipated time}}$ Change Cost Factor = $\frac{\text{Total cost of changes in works}}{\text{Actual total cost of works}}$

Figure 8: Summary of available measurement methods of KPIs in Saudi Arabia

2.5.3 Malaysia

A significant clue to success of overall organization are KPIs, which can reach the dream vision, important mission, strategy of business and no less important the main goal and purposes (Krishnapillai, 2009).

According to Ishak and Sahak (2011), the Government Organization of Malaysia apply Performance Measurement Model to measure performance.

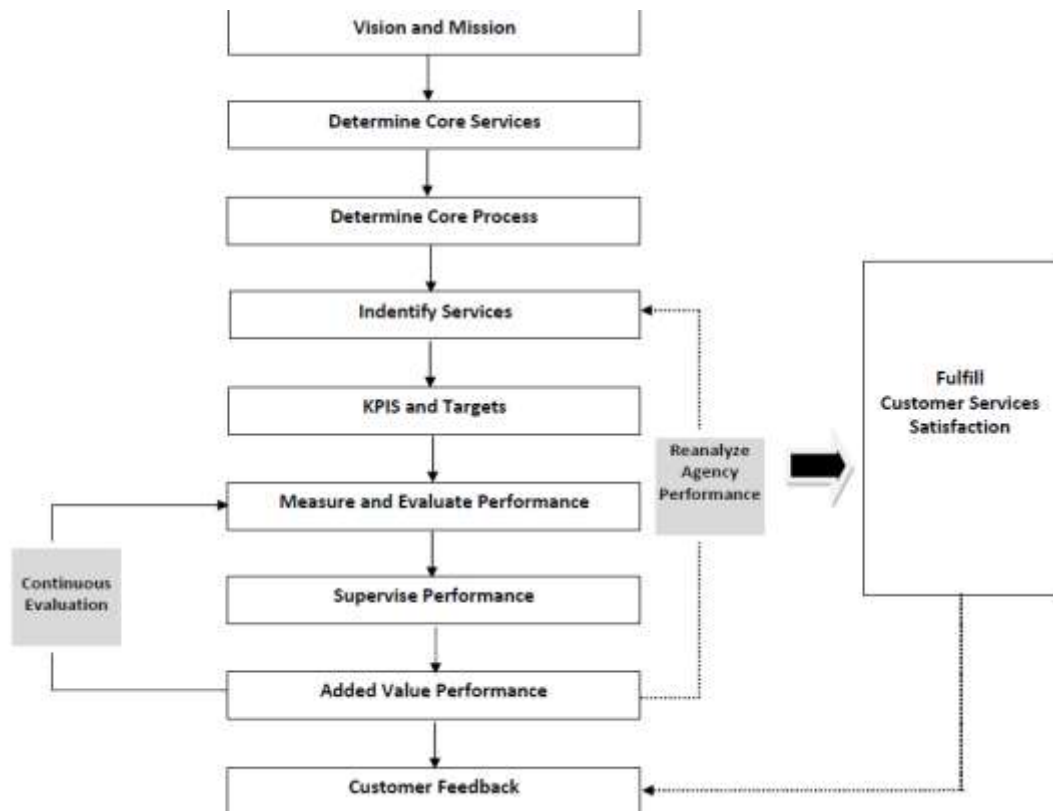


Figure 9: Performance Measurement Model (MAMPU, 2005)

In their study, this scheme depicts obviously the overall installation and setting of KPIs in the structure. This sample characterizes obviously how to evolve key performance indicators and shows the linkage with the purpose to create client demand of satisfaction. A constant measurement operation to guarantee maintenance of service supplied for clients are constantly pertinent with agency's purpose and client needs.

The result of services is also an indicator of performance measurement by controlling client's responsiveness on service's delivery. According to Ishak and Sahak (2011), the impressive heart of operations in these services should be evaluated from point of view of accuracy time of the services. Nevertheless, KPIs also assist libraries to rerate the entire services to claim appropriateness and impressiveness for client point with the vision, task and purposes of state agencies (MAMPU, 2005).

In the 1980s, by BI players begun the descent of key performance indicators from execution of performance instrument which is famous as benchmarking. According to Syuhaida & Aminah (2007) hard quantification of an actual condition of business, that was that instrument that could be represented in both measurement which are quantitative and qualitative. “Quantitative and Qualitative measurement of performance of the draft or institution towards its goals and purposes” that how was defined KPIs in the BI area (Syuhaida, 2009). Nowadays, KPIs are presently being used by a lot of zones and fields around the world. For instance, in teaching and formation, manufacturing etc. The main theory, rule and conception idea of KPIs stay the same, but its definition is diverse.

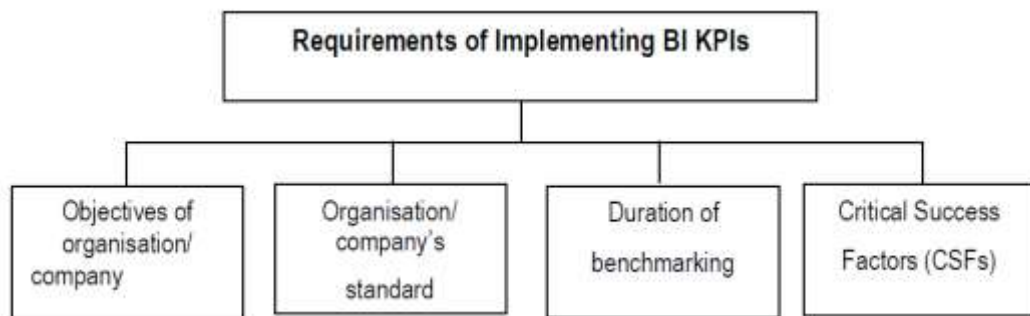


Figure 10: Four Requirements of BI KPIs Implementation

Accordingly to the studies of Syuhaida (2009), performing the BI KPIs has four demand and requirements. All concerted objectives and goals need to be attained by institute, firm or organization. The norm established by the company or institute to make the adjustment enhancement to be placed. The resolute continuance of evaluating the implementation, i.e. a certain performance as critical success factors (CSFs) that lead the whole entity to reach the key performance indicators.

Their study, KPIs accordingly applied to the construction industry exclusively in Malaysia are transpired in a connection with sharpened intrigue in ameliorate the primarily key performance indicators which are impressive in the practice of Business Intelligence (BI).

According to Syuhaida and Aminah (2007), the Construction KPIs in Malaysia is defined as “the orderly and described key performance indicators via cautious and regular consideration, expertise, where key performance indicators take excellence of social critique regarding the cooperation between administration and particular concessionaires in addition to achieve a purpose of improvement economic and social framework from the public sector acquisition approach.

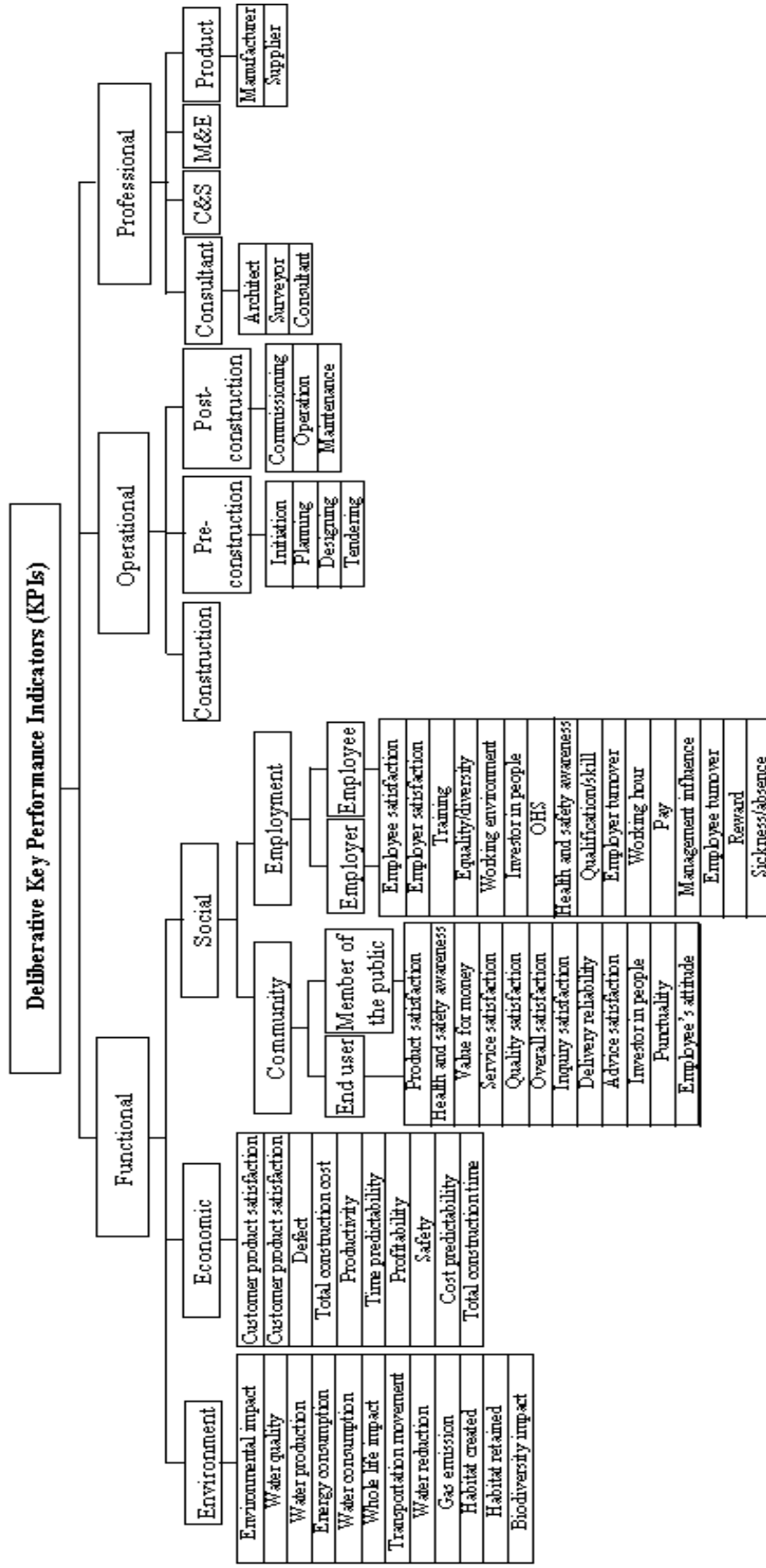


Figure 11: Categorizations and Prioritizations of Malaysian's Construction (Syuhaida and Aminah, 2007)

Chapter 3

RESEARCH METHOD

3.1 Introduction

This section provides a short interpretation of the main research objectives and the explanation of how the research was accomplished. Furthermore, in this chapter the final intelligence and data analysis methods will be discussed.

The main purpose of this research is to determine the better performance measurement systems in construction industry and implementation of KPIs in Kazakhstan construction industry. In addition, previous empirical works have proposed several examples and important remark of KPIs in different countries in construction industry. However, most of the construction companies in Kazakhstan have not applied this systems and experience of other countries will provide us with their data.

To reach and attain the main objectives of this investigation, a working process is fully supported by scientific operations and recommendations to guiding advices, to receive realistic and precise data.

3.1.1 Research Objective 1

At first, the purpose is to define the indicators which affect performance of Kazakhstan construction industry. The extant literatures (e.g., Hany Abd Elshakour M. Ali, 2012; Michail Kagioglou, 2001; Nandhinipriya G., Kowsalya R., 2015; Ljubo M.,2011; Mladen R.,2011; Salma Y.M., Stephen S., 2002; Dayana B., 2006; Ilhan Yu, 2007) provided a big importance about the factors that are united in this research to provide significant framework for performance measurement.

3.1.2 Research Objective 2

The second purpose is to acquire about owners, managers and at last employees perception about the Relative Importance Index (RII) of the KPIs of Kazakhstan construction industry.

That method has always been wished when the interpretative aspects of analysis are concen (Johnson & Lebreton, 2004). Usage of this technique is of large significance in a point of view of defining the relative importance of KPIs in construction. By following the equation, RII can be calculated:

$$RII = \frac{\sum W}{A \cdot N} (0 \leq RII \leq 1)$$

Where:

W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where “1” is “strongly disagree” and “5” is “strongly agree”);

A – is the highest weight (i.e. 5 in this case) and;

N – is the total number of respondents.

3.1.3 Research Objective 3

The third goal of this research is to measure the relationship between the KPIs involving another analysis, which is Pearson Correlation analysis.

3.1.4 Objective of Research 4

The fourth main goal is to test the hypothesis in relation to KPIs. T-test is needed for this analysis.

In case of null hypothesis (Ho): There is no interrelation between targets and the performance indicators.

In case of alternative hypothesis (H1): There is a interrelation between targets and the performance indicators.

All hypotheses will be analyzed on performance indicators, individually to each other.

3.1.5 Research Objective 5

The main purpose is to propose a framework of KPIs that will be suitable for construction industry of Kazakhstan.

3.1.6 Content of questionnaire survey

The scope of the questionnaire survey are accepted from the antecedent researches as mentioned earlier. Content of questionnaire consist of two main parts:

- 1- The first part contains questions about the construction firm; for example the number of employees, their job, type of the firm in building construction industry.
- 2- The second part includes questions about the extent, importance, and mechanism of applying KPIs in construction firms. In this step, the

construction executives were requested to rate KPIs based on their vocational assertion in a Likert type extent (where 1= very low significance, 2 = poor importance, 3= average significance, 4= good importance, and 5 = great significance).

All respondents were given a chance to add and rate extra indicators. In the questionnaire survey, there are questions that are not pragmatic or show the real state for the construction industry of Kazakhstan. The trend of being biased is avoided by using the option of five Likert response (Likert, 1932). Most of responders do not speak English language, so all data was gathered in Russian language, then it was translated.

3.1.7 Reliability Test and Validity

According to Pilot and Hungler (1985), the test of validity presents a degree where evaluates construct or alternating hold its anticipated properties. To provide the precision of suggested questionnaire survey, researches able to use two methods; Pearson test or Spearman, item loadings. Reliability coefficient indicates the steadiness and sequence of instrument, the coefficient of Cronbach or Cronbach's alpha. Diapason of Cronbach's alpha is between 0.0 - 1.0. If the coefficient is too close to 1, the higher inner consistence of load items. The Cronbach's coefficient or alpha can be calculated by using this equation:

$$\alpha = \frac{n}{n-1} \left(1 - \frac{\sum Vi}{V_{test}} \right)$$

n = number of questions

Vi = variance of scores on each question

Vtest = total variance of overall scores (not %'s) on the entire test

Chapter 4

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter will provide the findings, results and outcome of this research. All obtained findings and results are introduced accordingly to the format of questionnaire. The proposed research questionnaire is composed of three main parts: general information, applying KPIs in construction industry, and rating of each KPI. Figure 12 below represent a model of the proposed conceptual model.

The nondisclosure of all 73 respondents was ensured to obviate public curiosity area advised and recommended. To communicate with respondents and gather all data, the assistance of the Association of Kazakhstan Engineering was used. Foremost, 85 questionnaires were apportioned to all respondents (owners - 15, managers – 28, employees – 42). Finally, 73 questionnaires were gathered at all. All 73 questionnaire answers were decently analyzed. Some programs were used in this research, like SPSS and Microsoft Excel.



Figure 12: Conceptual Model

The conceptual model itself was divided into 5 perspectives. There are many groups of KPIs, but these indicators were dismantled and combined in different perspectives namely; financial, business, customer, learning and growth, and the environment. The numbers of respondents are shown in Table 4. The Figure below represents the demographic distribution: eleven (11) are owners, twenty five (25) are managers and finally thirty seven (37) are employees.

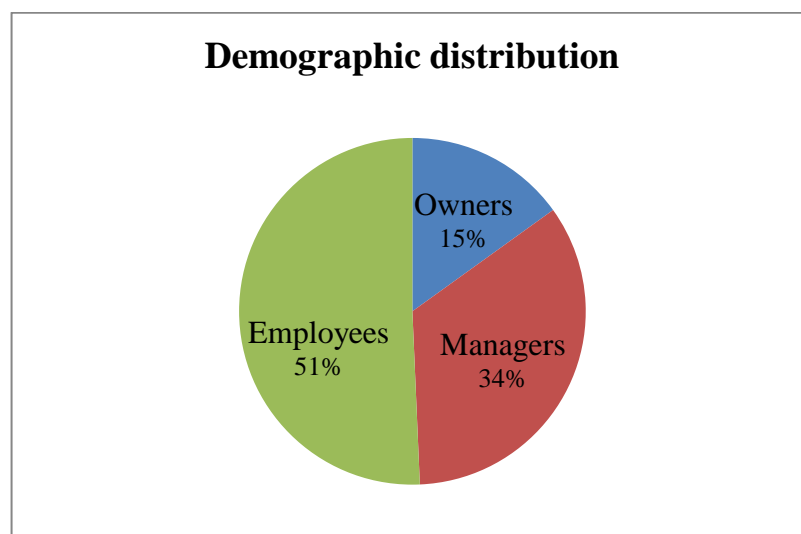


Figure 13 : Demographic data of 73 respondents

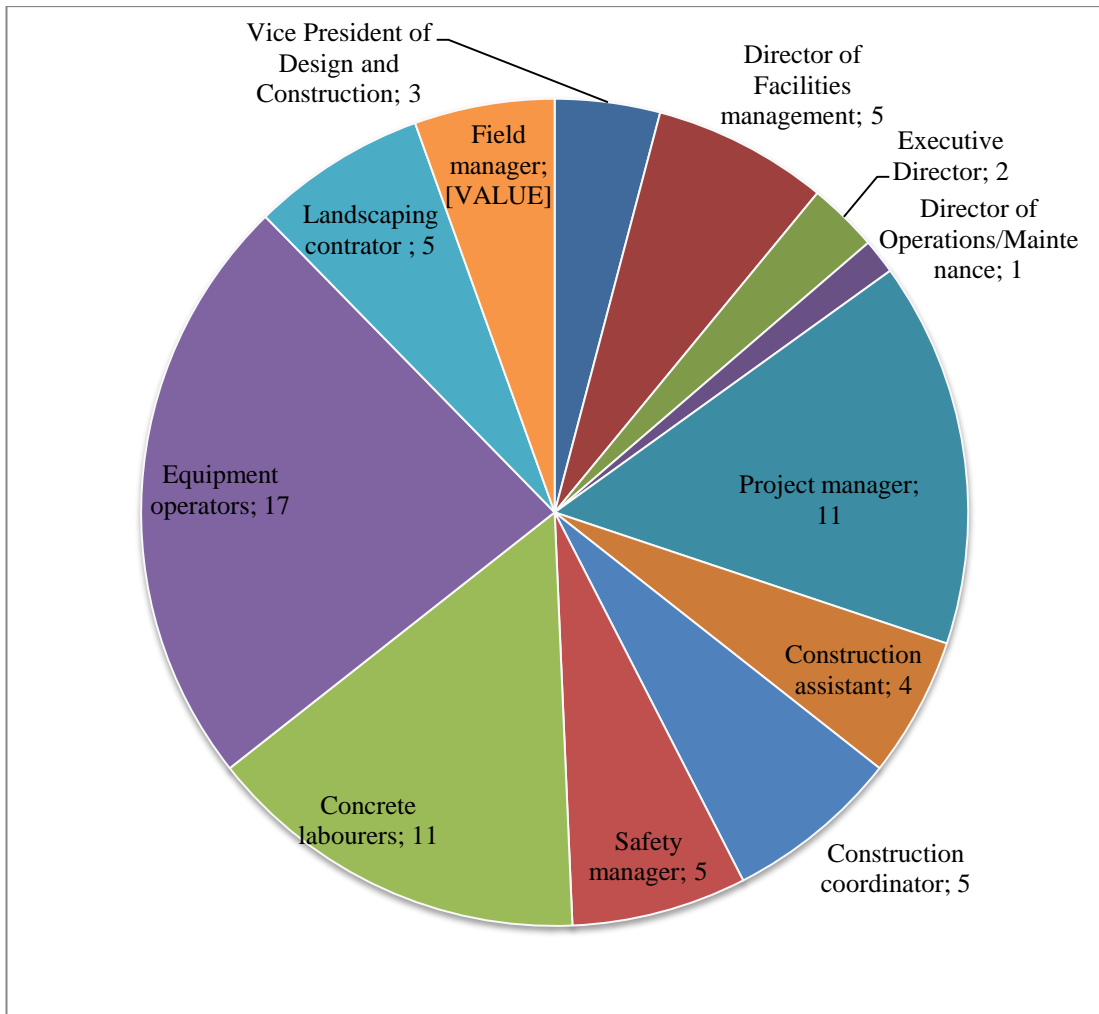


Figure 14: Demographic distribution of current job position of respondents

This figure above shows the amount of all respondents, their job positions and their quantity. There are 11 Owners: Vice President of Design and Construction - 3, Director of Facilities management - 5, Executive director - 2 and Director of Operation/maintenance -1. Considering managers, there are 25: Project manager - 11, Construction Assistant - 4, Construction Coordinator - 5, Safety manager - 5. Finally, there are 37 employees: Concrete laborers - 11, Equipment Operators - 17, Landscaping contractor - 5 and last 4 are Field engineers.

4.2 Basic Information

Table 4: Organization's type

Respondents	Quantity	Percentage
Owners	11	15%
Managers	25	34%
Employees	37	51%
Total	73	100%

Table 4 shows the quantity of respondents. It is obvious from the table that, most of the respondents are employees – 51%, 34 % are managers and 15% are owners. Table 5 shows the type of organizations. Most of the respondents are from Civil Engineering and it is clearly that not less people are working in this construction of buildings.

Table 5: Organizations in the Kazakhstan construction industry

Type of organization	Owners	Managers	Employees
Road construction	18.18% (2)	20% (5)	27% (10)
Civil Engineering	63.63% (7)	44% (11)	40.54% (15)
Construction of buildings	18.18% (2)	36% (9)	32.43% (12)

Table 6: Companies in the Kazakhstan construction industry

Type of Organizations	Type of construction firms and companies	
	National	Foreign
Road construction	3	0
Civil Engineering	2	2
Construction of buildings	3	1

Table 7: Size of companies and their quantity

Type of Organization	Quantity of workers		
	More > 50	More >150	More >250
Road construction	–	2	1
Civil Engineering	1	2	1
Construction of buildings	1	1	2

At this stage, with the rotation of varimax, and value which is less than 1 that is called Eigen, a factor analysis is conducted. All loadings of factor are temperate. Then reliability of the scale items was checked. As a final step, the compound of factors conceded a fine fit for inner sequence of indicators. It seems that issue of reliability is non-existing or being an issue according to our files. Many studies have agreed that the value of coefficient of Cronbach's Alpha need to be above 0.6 (Hair et al., 1998; Hair et al., 2006).

Table 8 shows the factor loadings, and the reliability analysis for Financial perspectives. The factor loadings were adequate.

Table 8: Reliability analysis (Financial) and Factor loadings

Financial (7 items)	Loadings	Cronbach's Alpha
Profitability	0.822	0.820
Financial stability	0.816	
Cash flow	0.819	
Construction Cost	0.820	
Interest cover	0.822	
Growth	0.813	
Cost Predictability	0.831	

Table 9 shows the factor loadings, and the reliability analysis for Business perspectives. The factor loadings were adequate.

Table 9: Reliability analysis (Business) and Factor loadings

Business (14 items)	Loadings	Cronbach's Alpha
Business efficiency	0.833	0.819
Effectiveness of planning	0.823	
Managers competency	0.829	
Technological capability	0.806	
Quality of product	0.818	
Defects	0.808	
Staff turnover	0.820	

Time predictability	0.815	
Time for construction	0.826	
Resource management	0.826	
Quality of service and work	0.813	
Health and Safety	0.829	
Productivity	0.817	
Innovation	0.815	

Table 10 shows the factor loadings, and the reliability analysis for Customer perspectives. The factor loadings were adequate.

Table 10: Reliability analysis (Customer) and Factor loadings

Customer (3 items)	Loadings	Cronbach's Alpha
Market share	0.815	0.818
Customer satisfaction – product	0.817	
Customer satisfaction – service	0.824	

Table 11 shows the factor loadings, and the reliability analysis for Learning & Growth perspectives. The factor loadings were adequate.

Table 11: Reliability analysis (Learning & Growth) and Factor loadings

Learning & Growth (4 items)	Loadings	Cronbach's Alpha
Continuous improvement	0.807	0.816
Investors in people	0.813	
Training (Qualification Skills)	0.817	
Motivation	0.827	

Table 12 shows the factor loadings, and the reliability analysis for Environment perspectives. The factor loadings were adequate.

Table 12: Reliability analysis (Environmental) and Factor loadings

Environment (6 items)	Loadings	Cronbach's Alpha
Main water use	0.823	0.822
Impact on society	0.822	
Waste	0.817	
Energy use	0.822	
Impact on biodiversity	0.827	
impact on environment	0.826	

At that stage, the compound of factors conceded a fine fit for inner sequence of indicators as shown below in table 13. It seems that issue of reliability is non-existing or be an issue according to our files.

Table 13: Reliability analysis (All Perspectives) and Factor loadings

All Perspectives	Loadings	Cronbach's Alpha
Financial	0.820	0.819
Business	0.819	
Customer	0.818	
Learning & Growth	0.816	
Environment	0.822	

Table 14: Pearson Correlation Analysis

Perspectives	1	2	3	4	5
Financial	-				
Business	.70*	-			
Customer	.67*	.69*	-		
Learning & Growth	.66*	.67*	.65*	-	
Environment	.62*	.60*	.61*	.61*	-
Mean	3.9	3,7	3,7	3,8	3,0
Std	0.58	0,55	0,42	0,6	0,32

* At the level of 0.05 (two tailed) the correlation is essential.

Table 14 presents a study alternating of Pearson correlation analysis. The table displays the dependence on each other most of performance factors. For instance, the linkage between Financial and Business perspectives have affirmative correlation, such as better goes business the higher its financial status. Similarly, the higher is customer satisfaction the better the effectiveness of the whole business.

4.3 Determination of Factors Influencing the Performance

Table 15: the Relative Importance Index (RII) and rankings for financial factors

Financial	Owner		Manager		Employee	
	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank
Profitability	0.9454	2	0.896	3	0.8756	2
Financial stability	0.8909	4	0.896	3	0.7135	4
Cash flow	0.9636	1	0.944	1	0.8918	1
Construction Cost	0.9455	2	0.912	2	0.8378	3
Interest cover	0.6	7	0.624	7	0.5621	7
Growth	0.8727	5	0.752	5	0.681	5
Cost Predictability	0.6909	6	0.704	6	0.6594	6

The Table 15 below shows the ranking and RII for financial perspectives based on the response provided by respondents (owners, managers, employees) for each factor. The result shows that cash flow is the most important item for everyone followed by construction cost and profitability.

The Table 16 below shows the ranking and RII for business perspectives based on the response provided by respondents (owners, managers, employees) for each factor. The result shows that the productivity is most important and followed by quality of service and work, and quality of a product.

Table 16: The Relative Importance Index (RII) and rankings for Business factors

Business	Owner		Manager		Employee	
	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank
Business efficiency	0.8909	6	0.784	6	0.8432	2
Effectiveness of planning	0.7454	11	0.704	9	0.6756	7
Managers competency	0.6727	13	0.704	9	0.6486	10
Technological capability	0.9272	3	0.856	3	0.7081	6
Quality of product	0.9272	3	0.848	5	0.8108	4
Defects	0.8	8	0.752	7	0.6162	13
Staff turnover	0.8	8	0.72	8	0.6756	7
Time	0.8181	7	0.664	13	0.6378	12

predictability						
Time for construction	0.909	5	0.856	3	0.8432	2
Resource management	0.6181	14	0.608	14	0.6108	14
Quality of service and work	0.9454	2	0.888	1	0.8108	4
Health and Safety	0,709	12	0.696	11	0.6702	9
Productivity	0.9636	1	0.88	2	0.8486	1
Innovation	0.7818	10	0.68	12	0.6486	10

The Table 17 below shows the ranking and RII for customer perspectives based on the response provided by respondents (owners, managers, employees) for each factor. It's clearly that customer satisfaction - product is most important.

Table 17: the Relative Importance Index (RII) and rankings for customer factors

Customer	Owner		Manager		Employee	
	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank
Market share	0.7636	3	0.688	3	0.5837	3
Customer	0.8727	1	0.832	1	0.7837	1

satisfaction – product						
Customer satisfaction – service	0.8	2	0.792	2	0.7837	1

The Table 18 below shows the ranking and RII for Learning & Growth perspectives based on the response provided by respondents (owners, managers, employees) for each factor. According to the results, training is most important item for all respondents.

Table 18: the Relative Importance Index (RII) and rankings for learning & growth

Learning & Growth	Owner		Manager		Employee	
	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank
Continuous improvement	0.9272	2	0.672	3	0.6432	3
Investors in people	0.7272	4	0.656	4	0.6	4
Training	0.9454	1	0.928	1	0.8486	1
Motivation	0.8363	3	0.824	2	0.7513	2

The Table 19 below shows the ranking and RII for Environment perspectives based on the response provided by respondents (owners, managers, employees) for each factor. The result shows that the most important measure is impact on society, followed by waste and impact on biodiversity.

Table 19: the Relative Importance Index (RII) and rankings for environment

Environment	Owner		Manager		Employee	
	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank	Relative importance Index (RII)	Rank
Main water use	0.6	4	0.592	5	0.5405	6
Impact on society	0.6727	2	0.632	1	0.6108	2
Waste	0.7454	1	0.6	2	0.6	3
Energy use	0.6545	3	0.6	2	0.6	3
Impact on biodiversity	0.6	4	0.6	2	0.6162	1
impact on environment	0.6	4	0.576	6	0.5837	5

The Table 20 below shows the ranking and RII based on the response provided by respondents (owners, managers, employees) for each factor. The Table shows the overall rankings and RII's of the performance indicators when combined as whole.

Table 20: RII (Ranking)

Perspectives	Owners	Managers	Employees
Financial	0,859 (1)	0,8182 (1)	0,7459 (1)
Business	0,8441 (2)	0,7706 (2)	0,7177 (2)
Customer	0,8121 (4)	0,76 (4)	0,7171 (3)
Learning & Growth	0,822 (3)	0,77 (3)	0,7108 (4)
Environment	0,6454 (5)	0,6 (5)	0,5918 (5)

Table 21: T-statistics and p-value of T-test for performance indicators

Perspectives	Owners	Managers	Employees
Financial	T= 63.271(p=0)	T= 51.513(p=0)	T= 75.029(p=0)
Business	T= 81.131(p=0)	T= 54.771(p=0)	T= 17.321(p=0)
Customer	T= 22.121(p=0)	T= 16.441(p=0)	T= 10.761(p=0)
Learning & Growth	T= 59.141(p=0)	T= 35.226(p=0)	T= 11.311(p=0)
Environment	T= 29.896(p=0)	T= 21.101(p=0)	T= 12.306(p=0)

The next objective is to determine the difference between all entities. That should be completed by T-test and by RII. According to the research objectives the null hypothesis is tested for each indicator to the distinction betwixt all respondents. According to the outcome, financial perspective is ranked first by owners with an RII equal to 0.859 an ranked first by both managers and employees as well with an RII equal to 0.8182 for managers and 0.7459 for employees, as shown in Table 15. T-test for financial perspective has differences: owners (T=63.271 , p=0), managers

($T=51.513$, $p=0$), employees ($T=75.029$, $p=0$). According to the results, it's clearly that the alternative hypothesis is accepted and the null hypothesis is rejected. The interpretation of this results show that all respondents are interested in profitability of company and its cash flow.

In the results, business factor is ranked second by owners with an RII value equal to 0.8441, and ranked second both by managers and employees as well. The RII value for managers is equal to 0.7706 and for employees is equal to 0.7177. The explanation of the results is that all of the participants are interested in the promotion of business, ranging from working conditions, the quality of performing services to the equipment condition and innovations in the construction industry. T-test for this business perspective shows the differences between the respondents; owners ($T=81.131$, $p=0$), managers ($T=54.771$, and p value = 0) employees (for $T = 17,321$ and p value = 0). Same operation as previous one, null hypothesis is rejected and alternative hypothesis is accepted as seen in Table 16.

According to the results, customer perspective is ranked fourth by both owners and managers. The RII value for owners is equal to 0.8121 and 0.76 by managers. This indicator is ranked third by employees and its RII value equal to 0.7171. According to the result, employees are more interested than owners and managers in activities to satisfy customer's confidence, because employees often interact with clients. The results of T-test for customer perspective displays that there is a discrepancy betwixt all responds of groups; owners have $T=22.121$ and value of $p=0$, managers have $T=16.441$ and $p=0$ and finally employees have $T=10.761$ and $p=0$. The results show that the alternative hypothesis is accepted and the null hypothesis is rejected as seen in previous Table 17.

According to the findings, the learning & growth perspective was ranked third both by owners and managers. The RII value is equal to 0.822 for owners and 0.77 for managers. This indicator is also ranked fourth by employees with value of RII equal to 0.7108. To summarize it, both owners and managers seem to be concerned in trained personnel, learning and implementing new techniques, their knowledge in the industry and confidence in making important decisions in the project. This will lead to enhance and fasten processes of work. T-test for learning & growth indicator shows the results; owners have $T= 59.141$ and $p=0$, for managers $T=35.226$ and value of $p=0$ and finally employees have $T=11.311$ value of $p=0$. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted as shown in Table 18.

Finally, the Environment perspective was ranked fifth by all groups and RII value equal 0.6454 for owners, 0.6 for managers and 0.5918 for employees. According to the results, it seems that this perspective is not significant for all respondents. All external factors like air quality, polluted water and biodiversity does not have an important effect on the performance in Kazakhstan construction industry. T-test for environment perspective shows some differences in the results; owners ($T=29.896$, $p=0$), managers ($T=21.101$, $p=0$) and employees ($T=12.306$, $p=0$). Consequently, the null hypothesis is rejected and the alternative hypothesis was accepted.

Table 22 describes all ten significant measurements influencing the performance of construction industry of Kazakhstan and this concept is empirically assisted by all respondents. It was referenced above, the outcome in table 20 shows that cash flow is the main significant indicator amid all other indicators in the construction industry in Kazakhstan with the value of RII equal 0.933 and was ranked first. Thereby, it is

elaborated as a firm soil for construction industry. The proposal for this that an unceasing stream of money is necessary from beginning of the project until the end of building in construction industry. Any success of a project depends on a stable flow of cash, otherwise without it the whole condition of project is endangered. The second indicator was “training” with the value of RII equal to 0.907. That indicator performs an important part in the development of industry, training of staff very significantly affects the quality in supplying the services, their performance and improvement and development of the company in general. This inclines to enhance both financial and business abilities of construction companies and organizations to acquire new kind of draft, acquisition of new apparatus and their safety usage by adequate professionals.

Table 22: Ten significant indicators affecting the performance, RII (Ranking)

Significant indicators	All responses RII (Ranking)
Cash flow	0.933
Training	0.907
Profitability	0.9
Construction Cost	0.898
Productivity	0.896
Time for Construction	0.865
Quality of service and work	0.88
Quality of product	0.86
Business efficiency	0.839
Customer satisfaction – Product	0.829

Third, profitability is different significant indicator that considerably influences on construction industry itself, and also was ranked third by all groups of respondents with value of RII equal to 0.9. That indicator affects the all indicators and whole industry. Profitability affects all aspects of construction, from the hiring of workers, equipment, further development of the company in the field of construction, improvement the base of construction itself to the satisfaction of the working class, and the adoption of new, more complex projects and competition at world level.

In this research the next indicator which is Construction Cost was ranked fourth by respondents with the value of RII equal 0.89. Cconstruction cost has a major part in the project. It affects the quality of services scale of the entire construction, inclusive a material cost, and no less important cost for equipment which is necessary. It also includes incidental expenses associated with defects and disassembling.

The next performance indicator is productivity and ranked fifth with value of RII equal 0.896. Productivity is the most obvious indicator that shows the use of the workforce in the enterprise. The level of productivity in the construction influences into two major important factors, the number of products produced per unit time, and time required for fabrication production unit. This indicator also affects the competitiveness of the entire company.

The quality of service and work was ranked six and its value of RII is 0.88. This indicator evaluates the level of fault and deliverables which is measured by client and its satisfaction. This indicator affects many other indicators such as profitability, customer satisfaction, market share, growth and financial stability. Quality always should be managed.

Time for construction was ranked seven by all groups and that indicator performs an important part in the planning and reliability in Kazakhstan's construction industry with value of RII equal 0.865. That aspect is necessary for good planning in construction industry. As example, the capital which distributed for whole project is defined by scheduling. Nevertheless, unpredictable incidents related to nature, such as flood, sudden earthquake or low visibility because of weather sometimes cause deceleration. Also because of that, assumed expenses will raise and time for construction. Consequently, correct and good prognosis should be considered into account by planners.

Indicator which is quality of product has a significant part of any construction productivity. According to the results, this indicator was ranked the eight with value of RII equal 0.86. Moreover, that indicator plays an important influence of company's level and trust in the Kazakhstan's construction industry. All products that are made with good quality will have excellent durability and will keep customer's satisfaction and maintain high competitiveness of the company in the construction field.

The business efficiency was ranked ninth by respondents with value of RII equal 0.839. That indicator appears to impact the performance of organizations in Kazakhstan. This indicator has an ultimate impact in the construction field. It includes for example: investors - where effective usage of resources could aid control main hazards and improve portfolio incomes, contractors - improving competitiveness and profitability through efficient use of resources, manufactures – achieving significant cost savings, enhancing the brand and increasing a business opportunities.

Customer satisfaction – product indicator was ranked ten with value of RII equal 0.829. Customer satisfaction is impacted by special client’s requirements. That indicator was developed that addresses a certain criteria where customers feel themselves to be important. It is important to know customers satisfaction about completed work and product. No less important the orderly monitoring need to be considered and conducted by open dialogue among client and supplier.

4.4 Types of Wallchart and Graphs for Comparison

The ranking shows what kind of graph or chart is more significant and useful.

Table 23: Wallcharts and Graphs (Ranking)

Wallcharts & Graph	Owners	Managers	Employees
Radar Chart	54.54% (6)	48% (12)	54.05% (20)
Bar Chart	27.27% (3)	24% (6)	13.51% (5)
Line Graph	9.09% (1)	20% (5)	18.91% (7)
Other	9.09% (1)	8% (2)	13.51% (5)
Total	100% (11)	100%(25)	100% (37)

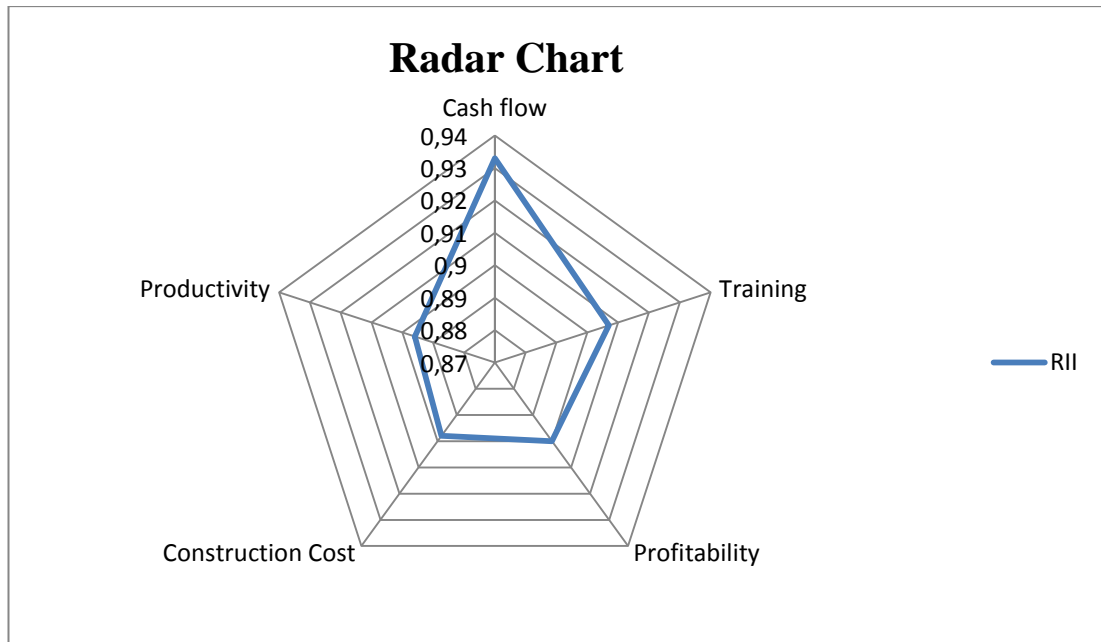


Figure 15: Radar Chart for the first five important indicators

In this figure, the first 5 indicators are most important from the result of the respondents. Radar chart helps without any complications to determine the significance of the data in ascending indicators. Radar chart shows comparison between quantitative variables. Nonetheless, this chart helps to see which variable is high or low within the dataset. This makes Radar Chart perfect to display the performance. According to the results from respondents, Radar chart seems to be one of the most significant chart for most of respondents: owners, managers and employees. The radar chart gives a rapid picture of the organization's overall benchmark performance. Nevertheless, that kind of chart is very well for presentation the outcome and results of some set of key performance indicators. In the other hand, for individual key performance indicators, line graphs and bar charts are preferably for report and presentation.

Based on the results found, the conclusion can be derived. All used 34 KPIs were reviewed and distributed between 5 perspectives, each of which is responsible for a

specific area. For the financial part includes such indicators linked with money, earnings, and costs of construction and overall financial stability of the organization. Business indicators are responsible for the time spent for the construction, innovation in terms of equipment and construction quality in supplying the services, general layout and efficiency of the business. Clients are such indicators that determine the level of customer satisfaction and a general market share. An important for owners and managers is staff training. Results showed that training is one of the most important indicators in the survey. Continuous development and motivation are also in the perspective of learning and growth. Last and least, the environment perspective. Ironically, in the use of energy, water and impact on the environment very few people are interested in Kazakhstan.

From the following specific analyzes, Cronbach's alpha allows to determine the value of each of the 5 prospects and the general average value equal to 0.819. Pearson correlation analysis shows the relationship between the perspectives and their relationship. A strong relationship is between all perspectives except the last. In environment very few people are interested in and weakly linked to other prospects, as little interest shown to this term among the respondents. The next analysis defines RII index, which shows the most important indicators of the effect of which greatly advance performance across the organization. Based on the results obtained from the respondents, 10 of the most important indicators were determined namely; cash flow, training, profitability, construction cost, productivity, time for construction, quality of service and work, quality of product, business efficiency and customer satisfaction – product.

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

Big amount of mistakes and faults, revision, low level of performance nowadays has driven to the necessity of implementation of key performance indicators. According to many studies and researches all performance measurement systems have a great impact in the construction industry. Developing and improving business efficiency is a most important plus in applying KPIs. It is clearly, that focusing only on several factors such as cost or time for construction and at the same time ignoring other factors which are responsible for quality and training of staff will not have a positive significance for effectiveness of construction organizations.

5.1 Conclusions of the Study

In Kazakhstan's construction industry there is a great need for a proper and workable performance measurement system. As was mentioned above, many authors have suggested a lot of various performance measurements and for this research all indicators can be combined to establishing a proper framework. Without any doubt in the construction industry the proposal framework is allowed for usage to scientists and scholars as a starting point. The objective of this research is to determine the most important KPIs for Kazakhstan construction industry. Therefore, it is clearly shown, how these findings and results are impacting the industry itself and its performance.

The research objective 1 is to define indicators that influence the overall performance of the construction industry in Kazakhstan. It was carried out by selection the pertinent literatures and studies. At the end, thirty four (34) performance indicators were determined. In order not to be confused, they were divided into five (5) perspectives that include suitable indicators for each one namely; financial , business, customer, learning & growth and finally environment.

The research objective 2 is about perception directed to relative importance of KPIs of Kazakhstan's construction industry which is identified by all respondents. Financial perspective has an appropriateness most to owners, because they incline to be more interested in money, its cash flow. Consequently, owners always will be more interested in overall profits of organization.

Business perspective is important for both owners and managers. Managers are the master planners of projects and can allocate the necessary commitments. It is important to understand and know that is necessary for companies in developing their business in the construction industry, ranging from employees, technical equipment to determine the time of construction and quality in supplying services.

Regarding customer perspective, it has a great appropriateness for managers and employees. Probable interpretation is inasmuch as the level of customer confidence determines employee's quality of their product, services and work. For managers it will show them where to focus efforts to reach clients satisfaction. It's clearly that managers seem to pay more attention to client satisfaction more than owners.

Employees seem to be more interested in learning & growth perspective. In this case, it is clearly seen, that more trained and educated staff will produce in high rank of quality and quantity. Trained personal will be credible on the part of customers. It improves the quality of work that itself will lead to big profits and high competitiveness of the company at a high level, but also important is the impact on the wages of all employees.

The last but not the least, for environment perspective the responses show no priority for that perspective in Kazakhstan's construction industry. Based on the practical point of view, The Republic of Kazakhstan is developing country, whereas a big amount of money is being spent to avert and preclude pollution. These kind of procedures are promoted and conducted in most developed countries, while countries of Third World do not pay a great attention.

The research objective 3 is to identify the extremely significant KPIs of construction industry in Kazakhstan, by measuring level of agreement and disagreement among respondents (i.e. owners, managers, employees) in terms of ranking KPIs. The entire respondents agreed that cash flow is the most important indicator for construction industry itself followed by training of staff. Next is profitability, construction cost, productivity, time for construction, quality of service and work, quality of product, business efficiency and finally customer satisfaction – product.

The research objective 4 is about comparison of interrelationship betwixt rankings and importance for all respondents concerning key performance indicators.

According to T-test, it displays the difference of all responses in their view of knowledge of the KPIs. There is no doubt that many researchers have proposed different occasions that management agenda controls performance measurement. Nevertheless, every group if compared with each other will have an individual point of view in construction industry.

The research objective 5 is to propose a suitable framework for construction industry of Kazakhstan.

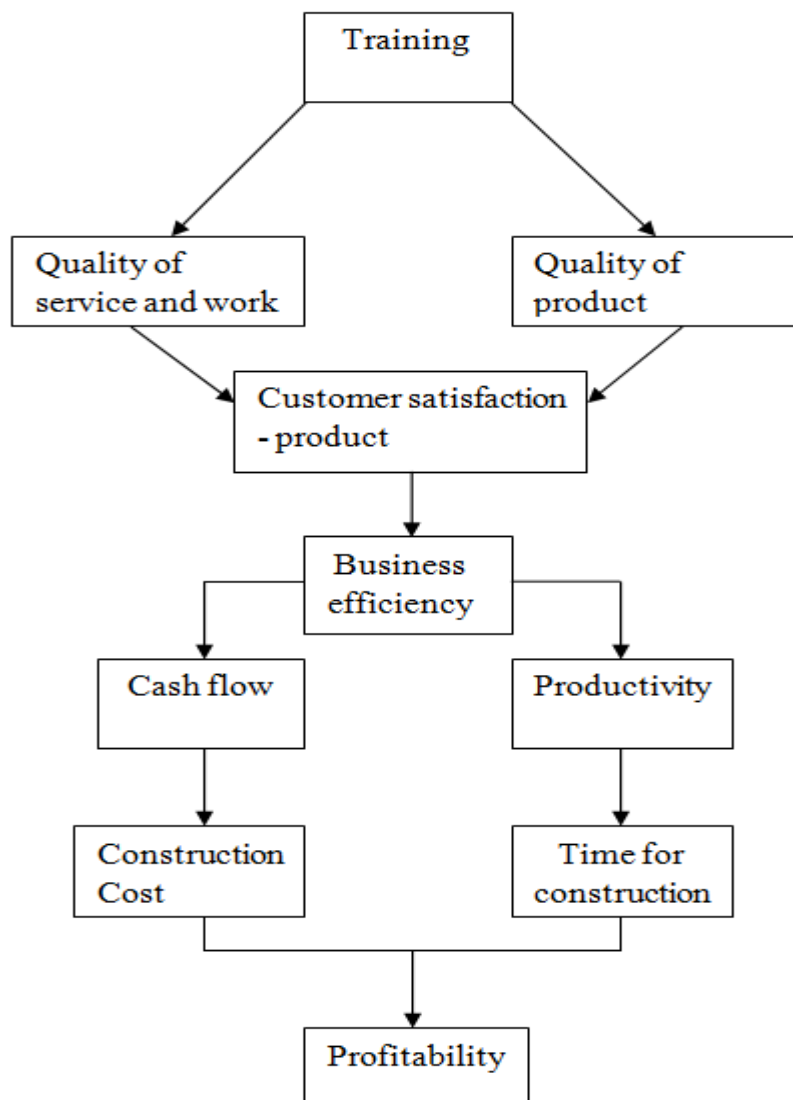


Figure 16: The proposed framework for construction industry of Kazakhstan

From this point, it is clearly known that the framework will be based on the results obtained from the respondents. All 10 key performance indicators defined and clearly shows that the need of the construction industry of Kazakhstan. First, from the results, in addition to cash flow managers and owners of firms and companies are very much interested and the training and education of staff. Perhaps this aspect is one of the most important, as this factor strongly influences the level of the company and an indicator of the effectiveness of the whole industry. Trained personnel with knowledge of not only basic but also advanced technology will help advance organization and increase profits, not to mention the Customer satisfactory and quality in supplying services. All values obtained in the studies are important in the construction industry and firmly interconnected. The high quality product is always the confidence of the customer and respectively during the construction also plays an important role. Allotted for the construction time should not exceed the time limits otherwise unplanned expenses cannot be avoided. In many ways it affects the human factor, absence from work, sickness, lack of clear instructions, and neglect of the equipment. But sometimes influenced by unexpected natural disasters. The better trained staff, the higher the quality of the work, improving customer satisfaction, increasing the efficiency of the business. It, in turn, determines the productivity and profitability of the entire organization in the construction industry. The construction industry of Kazakhstan is developing rapidly, but it is still working under the old scheme. The use and definition of the important indicators is not a simple process, and the implementation itself takes time.

For managers, it is difficult to hire a potential employee because it depends on their performance. Managers in the organization talk a lot of employees performance

where it ensures the support and advances to meet goal for the future of organization. Key performance indicators or KPIs for training managers are essential to achieve best enactment and to have a higher level in evaluation process where training managers are looking for positive feedback if they deserve to be a manager in the future. Key performance indicators are the tools to measure performance depending on quantity, speed, quality, innovation, value of currency and customer service to have an ultimate business benefit. The trainings also related for employees to help them enhance their skills to meet the value of expectation and effectiveness. KPIs for Training managers have huge benefits to an effective system in the organization such as understanding the ideas of metrics, handling problems in appraisal and evaluation, the balance scorecard and KPI method methodology. Knowledge, attitude and skill are still important for calculating results. The ability to access and analyze business process data is necessary to successfully manage construction projects. Knowing what KPI's will provide the insight for your unique construction company might be the most important requirement of all. It's easy to see that KPI's are very necessary to successfully run projects and construction business. Monitoring cash flows and cash control - one of the most important and critical for success metric for every construction business is cash flow. Successful businesses monitor cash flows from investments and operations closely and are aware that this is not the place for taking risks and making mistakes. Forecasting cash flows is a key discipline in construction industries and it makes difference between successful organizations and thousands of construction companies going out of business each and every year. Monitoring and tracking cash flow trends on your construction scorecard is a must. Cost – cost related metrics monitor the expenditures and spending per project and overall. It is important to track the cost metrics on an ongoing basis to ensure proper cash

management and manage the profit margins. Productivity – while monitoring costs is crucial it only gives you a limited perspective. The productivity metrics will tell you how much value your business creates for all stakeholders. Examples include levels of resource management, employee productivity and scheduling. These are all excellent sources of ideas for developing best practices and continuous improvement. For the quality of service and work and quality of product - quality control metrics ensure all customer requirements and project demands are met. Quality assurance KPIs help management minimize rework and defects as well as minimize the cost of quality while management is focused on customer satisfaction. Again both reactive and proactive metrics are considered for maximum impact on improving performances. Business efficiency is used to track and assess the status of a specific business process. Every area of business has specific metrics that should be monitored – marketing metrics can include tracking campaign and program statistics, while sales metrics may look at the number of new opportunities and leads in your database, and executive metrics will focus more on big picture financial metrics. In most businesses, the employees represent both an organization's biggest expense, and its most valuable asset. This means the company's productivity, and ultimately, its profitability depend on making sure all of its workers perform up to. To survive and prosper in today's economic times, companies can no longer manage using financial measures alone. Like with any business, goals must be set, plans should be created for achieving them and then efficiently execute strategies. Businesses have to track non-financial measures such as speed of response and product quality; externally focused measures, such as customer satisfaction. Customer satisfaction can be seen either as a goal or as a measurement tool in the development of construction quality. Customer satisfaction is an important factor in

the development of the construction process and customer relationship. As construction company's face-increasing competition, greater attention continues to be placed on customer relationships and satisfied customers. Customer satisfaction enables construction companies to differentiate themselves from their competitors and create sustainable advantage.

5.2 Future Research Directions

Many researches need to conduct similar study in this sphere in other countries. Most of them are supported to use a great sample size to increase reasonableness of the current findings. Future research can be evaluated and usage of mentioned above KPIs for construction industry can be measured after implementation. Estimating if these indicators can enhance effectiveness and productivity of all groups in construction industry could be a beneficial way.

To conclude, the issue raised in this research plays a crucial role in the construction industry of Kazakhstan. The process of introduction of such metering systems is very long and requires constant monitoring. Many large companies in Kazakhstan widely use these dimensions and measures that cannot be said about the owners of small and medium-sized businesses. Kazakhstan develops gradually, with it to be developed and the idea of improvement and development of the construction industry as a whole. The initial introduction and subsequent widespread use of these indicators and their measurement pushed the country to a higher level of performance and sophistication. We should follow the example of developed countries such as the UK, where it actually passed the first tests in the world. Many authors describe the different systems of approach and implementation. The framework of this study

clearly shows where it is necessary to emphasize in the first place, since it is not like other countries, it is a proposed strategy for Kazakhstan construction industry.

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APPENDIX

Appendix: Questionnaire Sample

First part: General information

1) Organization's type

Owner	Manager	Employee
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2) Type of Organizations in the Kazakhstan construction industry:

Road Construction	Civil Engineering	Construction of buildings
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3) Personnel assignment. Current job positions:

Office engineer	Foreman	Project manager	Architect	Other position
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Second Part: Determination of factors influencing the performance

Next table is consisting of several performance indicators influencing the construction industry; please give us your opinion on the importance of each key performance indicator for construction industry of Kazakhstan. Please tick your answer. Thank You.

Perspectives	Very low significance	Poor importance	Average significance	Good importance	Great significance
Financial Profitability					
Financial stability					
Cash flow					
Construction Cost					
Interest					

cover					
Growth					
Cost					
Predictability					

Perspectives	Very low significance	Poor importance	Average significance	Good importance	Great significance
Business efficiency					
Effectiveness of planning					
Managers competency					
Technological capability					
Quality of product					
Defects					
Staff turnover					
Time predictability					
Time for construction					
Resource					

management					
Quality of service and work					
Health and Safety					
Productivity					
Innovation					

Perspectives	Very low significance	Poor importance	Average significance	Good importance	Great significance
Customer					
Market share					
Customer satisfaction – product					
Customer satisfaction – service					

Perspectives & Learning Growth	Very low significance	Poor importance	Average significance	Good importance	Great significance
Continuous improvement					
Investors in people					

Training (Qualification&Skills)					
Motivation					
Continuous improvement					

Perspectives	Very low significance	Poor importance	Average significance	Good importance	Great significance
Environment					
Main water use					
Impact on society					
Waste					
Energy use					
Impact on biodiversity					
impact on environment					

Types of wallchart and graphs for comparison

Bar Chart	Line Graph	Radar Chart	Other
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