

Effect of Organizational Culture on Internal Innovation Capacity

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Abstract: An important amount of literature has argued on different aspects of innovation and factors affecting the performance of the establishment. Since all companies aim for sustainable innovation to reach sustainable profit increase, existing literature has highlighted the emergence of a well-constructed internal innovation system for innovation success. The internal innovation system has its own dimensions effecting the success of the whole system. But it doesn't stand alone for the innovation success, since the organisational culture has influence on the internal innovation capacity of the companies. This article investigates the correlation between the dimension of the internal innovation system and organisational culture by focusing on world's most innovative companies in a comparison with various innovative companies. Identifying the organisational culture of the companies from the competing values framework point of view is also in the scope of this study. This study aims to add value to the existing literature by identifying the dominance level of the internal innovation system dimensions and the organisational culture dimensions to provide guidance to the companies which have goal to improve their innovativeness.

Keywords: *effect on innovation, internal innovation system, innovation dimensions, sustainable innovation, innovation management*

Introduction

Innovation has become the corporate strategy for the companies aiming to reach sustainable operating profit and remain competitive in the market with bigger shares. It is clear that global competition has challenged the companies more than ever during the last decade. This reality has forced the companies to shorten their product and service development life cycles. But this hasn't been enough for the companies to remain in the market with sustainable profitability. On the other hand, providing unique products and services has become mandatory to reach the expected financial results. Companies have had to become more innovative and remain to be innovative.

There are several challenges in the way of becoming more innovative. Especially creating an organisational culture that supports and embraces innovation, seems to be the most important challenge, the companies face (Phillips, 2007). Organisational culture is the shared beliefs, principles, values, and assumptions that shape behaviour by building commitment, providing direction, establishing a collective identity, and creating a community. The effectiveness of culture depends on its alignment with the organisation's environment, resources, values, and goals (Wooten, 2010). Strong cultures often discourage change or new strategies when they are most needed, and resist new approaches or new methods (Phillips, 2007). Adaptation and implementation of innovation, need to align with corporate culture, to achieve the success.

Innovation is a multi-dimensional process, including firm culture, internal processes and external environment. Firm culture, internal processes and external environment define the firms'

'innovation capability'. Managerial Characteristics, Organisational Characteristics, Environmental Characteristics define the firms' 'innovativeness' (Neely and Hii, 1998). In the implementation of innovation, firms have to create an organisational culture and climate that fosters innovation by ensuring employee skills, providing incentives and removing obstacles. Innovative organisations in today's business environment are those who manage their resources innovatively (Dixit and Nanda, 2011). It is clear that Innovation dimensions and organisations' cultural dimensions' interaction must be investigated more, to provide an effective innovation implementation model for the leaders. The purpose of this research is to explore relationships between innovation system dimensions and organisational culture of the companies with sustainable innovation success by investigating the research questions below:

- Is there a certain implementation level for the dimensions of the internal innovation system for the innovation success?
- What are the outstanding internal innovation system dimensions?
- What is the correlation between the internal innovation system's and organisational culture's dimensions?
- Is there a relationship with companies' culture type from competing values point of view and their innovativeness?
- What are the gaps between the most innovative companies and innovative companies from internal innovation system and organisational culture point of view?

Literature Review

Innovation

Innovation is usually confused with the term of invention. There is a difference between the two and should not be used in the same sense because an invention may not necessarily lead to an innovation. Freeman (1982:7) cleared this case when he noted that: "an invention is an idea, a sketch or model for a new or improved device, product, process or system" whereas "an innovation in the economic sense is accomplished only with the first commercial transaction involving the new product, process, system or device..." Innovation can be defined by different ways in different sayings. It should be noted that 'change' refers to the basic characteristic of innovation. As a result, it is difficult to declare a general theory of innovation because even the 'change' phenomenon is not understood on its own. We will accept the OECD definition of innovation in line with the purpose of research.

"Innovation consists of all those scientific, technical, commercial and financial steps necessary for the successful development and marketing of new or improved manufactured products, the commercial use of new or improved processes or equipment or the introduction of a new approach to a social service. R&D is only one of these steps." (OECD, 1981:15-16)

Innovation is generally considered to be something new, but exactly what is new is various depending on point of view. Existing Literature has defined it as: a product or process, a behaviour, but also a business model. It is also stated for innovation to have four types as: 'product innovation', 'process innovation', 'marketing innovation', and 'management innovation'. In line with this statement another discussion on innovation defined four groups: 'product innovation', 'process innovation', 'positioning innovation', or 'paradigm innovation' (Johansson and Jönsson, 2014). Innovation is the most effective means of achieving 'economic success', 'increasing competitive power' and 'ensuring sustainable profitability'. (Kirner *et al*, 2009).

Innovation can be described as something destructive. It can occur as incremental or radical. It depends on whether you have reached an innovation performance on brand new or existing products or services. 'Incremental innovation' is an innovation type which improves the performance and efficiency of a product, a process or a system gradually. Developments are typically quite small and development is based on traditional management practices and innovation has little impact on the industry. 'Radical Innovation' is the type of innovation which shows major impact on industry. This type of innovation cannot be achieved by traditional management practices. It requires also a unique management and cultural climate (Johansson and Jönsson, 2014).

Attributes of Innovation

Abhishek (2009), highlighted the 10 major attributes of innovation derived from the literature:

1. Innovation involves the combination of inputs in the creation of outputs.

The combination of entries, forms the innovation output. Something novel is created during innovation. Certain critical inputs must exist for innovation to take place, and the exact nature of these inputs will vary depending on the desired outputs and outcomes.

2. Inputs to innovation can be tangible and intangible.

Innovation activities are based on various inputs, both material and non-material. There is an arrangement and cost for concrete entrances. An intangible entry does not have an arrangement, it can only be cost. Intangible inputs are generally referred to in the economic literature as "knowledge assets" and "intellectual assets" in the business management literature. Entries are accepted if they will generate future benefits.

3. Knowledge is a key input to innovation.

Innovation involves the application of knowledge in creative activities. Innovation cannot happen without understanding the resources, tools, technologies, materials, markets and needs of the current situation. Innovative organisations that accept the tremendous preoccupation of information in the innovation process are willing to fund significant amounts of research and knowledge.

4. The inputs to innovation are assets.

It is the fact that most innovation inputs are produced for a single innovation line, and then they repeat or use a pipeline resulting in a different flow. Intangible assets are seen as difficult to report, criticized by basic criteria are increasingly seen as critical to innovation.

5. Innovation involves activity for the purpose of creating economic value.

At the heart of the concept of innovation, the innovator has the intention of creating something with economic value; This is something that benefits the consumer and provides an economic return to the innovative company. The mechanism used to achieve the benefits of consumer-consumer innovation and the innovative company achieve transformation; Which is why it is critical for the innovative process.

6. The process of innovation is complex.

Innovation is a complex process that cannot be easily reduced to measurable elements. It's not linear, it's mostly repeaters instead. Outputs of previous activities become inputs of later processes. Innovation is at the same time not a linear combination of component factors or limited within the boundaries of firms. Non-linear dynamics characterize the whole innovation value chain at the national and firm level.

7. The outputs in innovation are unpredictable.

It is easy to characterize new entrants; They will always be resources and assets. However, output is difficult to characterize, especially before the process is complete. Outputs are unpredictable; because innovation is complex, non-linear and risky; respond to opportunities; and it naturally contains the aspects of wonder.

8. Knowledge is a key output of innovation.

Whatever the outcome of innovation, then they were bringing together the information of the company. Any concrete and intangible output will report the company's resources, technologies, markets and consumers.

9. For innovation, the demand side that determines the investment rate and spread of new products and services must be taken into account (Gamal, 2011).

Development of products and processes, and the introduction of intangible assets that integrate knowledge, skills and technologies in trade, constructs innovation. Innovation is crucial for understanding existing resources, tools, technologies, materials, markets and needs. These resources and information processes are used over and over again and are considered to be assets for return for the future. Innovative organisations provide a significant amount of resources to research and knowledge for this purpose.

10. Innovation involves research, development, and commercialization.

The application of knowledge is the key to an innovation process, which is an important part of both tangible and intangible assets. Since innovative inputs are used for future innovations, they are evaluated as being. However, the combination of inputs often results in a failure that makes this process complex and risky and ultimately unpredictable (Abhishek, 2009).

Innovation System Dimensions

Innovation Leadership

Leadership is mentioned to be the power supply and the core dimension of the creativity and innovation. Leaders must ensure the existence of the appropriate environment for organisational innovativeness. Also, its leaders' duty to construct the structure of innovation in organisations and lead the innovation processes to achieve the innovation. Most of the cases from business show us, innovation inspiration triggered by the leaders. Talented professionals follow this inspiration. Leaders' encouragement and management of the diversity in the organisations improve the innovation and ensure its sustainability (Phillips, 2007).

Innovation Motivation

Every goal has an underlying reason to act. This reason forces people to go beyond and achieve. Motivation is one of the core dimensions of organisational innovation. There is a strong need of organisational commitment for innovation success. Only motivated employees can add value to the productivity and improve innovation process. By the way, we cannot ignore the role of organisational culture on the innovation motivation in the organisations. The organisations those adapt innovation motivation to their culture achieve considerable innovation (Hartmann, 2006).

Innovation Strategy

An innovation strategy defines the company's posture towards its competitive environment in terms of development plans of new products, services, processes and business models. A successful innovation strategy is based on a systematic planning process including a systematic analyses of search areas – potential business areas for innovation taking into account internal and external factors. A thoroughly developed innovation strategy is the output of this systematic planning process that has to guide all innovation management activities (IMP³rove, 2007).

Knowledge Management

Innovation doesn't occur in a day. It occurs as a consequence of many successes and failures. It is important to understand these successes and failures for innovation achievement. To understand and store them are very important to benefit from them. Knowledge management is very important as a result of this necessity. Available knowledge is very critical for innovation process. We must ensure the connectivity to the knowledge which consists of rich and branched relations any time for successful innovation (Du Plessis, 2007).

Innovation Culture

Innovation activities take place in social and economic environment. This environment includes cultural and political characteristics which interact with organisations. An important amount of research results on innovation point to the relation between the environment and innovation. It is strongly clear that considering the culture is beneficial to figure out innovation concept (Jaskyte, 2004). Kanter (1983) suggested that innovative organisations need to adopt a "culture of pride and climate of success". Tushman and O'Reilly (1997) viewed culture as one of the most important factors in the management of innovation. Researchers have been examining the involvement of many concepts to better understand the factors that contribute to innovation culture.

Innovation Resources

Resources contain three main factors which are; people, systems and projects. These three factors have effect on innovation activities. All must be managed carefully and efficiently. Among all these three main factors, we can count "people" as the most important one. People have the significant effect on the companies' way to behave and run the business. They form the organisational culture. The people inspire and lead the innovation activities are much more important for the company innovation capacity (Rao and Weintraub, 2013).

Innovation Process

Innovation needs a well-defined path. Innovation process has two main stages as development and application. The first stage; development involves taking risks, searching for alternatives and exploring. The second phase, requires implementation, testing, refining and implementation (Pandey and Sharma, 2009). Appropriate innovation process is crucial for innovation achievement. "Innovation funnel" which is used for capturing and sifting the ideas or "stage-gate" systems for project review and prioritization are some outstanding examples for innovation processes (Rao and Weintraub, 2013). Organisations must choose a suitable process which complies with their organisational structure. Any process cannot be useful for any organisation.

Since, there has been an important amount of literature discussed on the dimensions of innovation, there is gap on measuring them on the most innovative companies. One of the goals of this research is to identify their implementation level in the world's most innovative companies comparing by various innovative companies, to provide clear view.

Organisational Culture

Cultural factors play an important role in innovation. The breadth of culture contributes to innovation. The social model manifests itself as "organisational culture" with certain characteristics of businesses. Culture can now be understood as a category; the only explanation of innovative action being used where structural and organisational factors are no longer sufficient to explain (Merican and Goktas, 2011). With the development of innovative potential, various models have been made showing the role of organisation culture. Hauser (1998) developed a conceptual model that suggested that the culture of the organisation plays a vital role in the process of innovation. On the other hand, Schein argues that organisational culture is what a group learns in a time when the group solves their survival problems. Learning to deal with issues of culture,

external harmony and internal integration argues that it is a pattern of basic assumptions that have been developed, discovered or developed by a particular group. The model is found in three levels; artefacts, values and basic assumptions.

Organisational culture leads the organisation to an innovative cultural orientation. Organisational culture has an influence on the degree of creativity and innovation in an organisation (Ismail and Barmaid, 2007). Given the complexity of the innovation phenomenon and the inconsistency of the results of innovation research, it becomes increasingly clear that the cultural perspective may be useful for understanding innovation (Jaskyte, 2004). Kanter (1983) argued that innovative organisations should win a "culture of proud and successful climate". Tushman and O'Reilly (1997) mentioned culture as one of the most important factors in innovation management (Ismail and Abdmajid, 2007). To feed and maintain an innovation culture, organisations must first develop a conducive environment in which members do not hesitate to contribute (Beck, 2004). Organisations need clarity, mutual trust, incentive management behaviours, strategic orientations, supportive structures, learning and knowledge acquisition approaches. For this reason, the development of innovation culture is primarily a managerial, cultural, strategic and structural factor. For this reason, a more participatory management style is preferred within a supportive culture, where communication and teamwork are most appropriate and where structural flexibility, empowerment of employees, risk taking and occasional failures are conceived. By incorporating these factors correctly, innovation has the potential to develop (Ismail and Abdmajid, 2007).

Jaskyte (2002) also supported the inclusion of organisational culture in innovation models to enhance the innovation of organisations. Obenchain (2002) examines the relationship between organisational culture and organisational innovation in higher education institutions, giving many organisational cultures. The results prove that the hopes for innovation practice are related to the culture type, especially the features of the adhocracy culture type (Ismail and Abdmajid, 2007).

This research also concentrates on identifying the organisational cultural types' effects on innovation like Obenchain, but differs on the research scope. Different than the educational organisations, the aim of this research is to identify this effect on companies those have commercial goals. There has been a gap from empirical studies point of view in this area. This research focuses to identify innovativeness and culture relation at company level. The motivation is to identify the effect of culture type on company internal innovation system and to add value to literature by developing a concept on identifying appropriate conditions and environment for company level innovativeness.

Assessing Organisational Culture

How should organisational culture be assessed? So far, there is no definitive answer to this question. The literature generally refers to a typology that has been proposed by Burns and Stalker as the distinction between mechanical and organic organisations. Both terms, both mechanical and organic, define organisational structures and organisational cultures. Communication in organic culture is lateral. That is, employees working in the research and development department talk to their colleagues in the direct marketing department. In mechanical cultures, communication involving a boss or an amateur is quite vertical. Decision making in organic cultures is often directed or influenced by employees who are technologically and / or market knowledge and not based on a hierarchical position. In addition, employees working in organic cultures are more acceptable than those working in mechanical cultures and have more opportunities to be open to new ideas, technologies or market insights. At the same time, organic cultures encourage the exchange of ideas and information rather than emphasizing a one-way flow from a central authority. Finally, it is assumed that organic cultures are more flexible in information processing

and exchange of ideas, and are therefore more likely to identify the potential for innovation. (Herzog and Leker, 2010)

Competing Values Framework

In addition to the mechanical-organic dimension, Quinn and his colleagues, as well as Cameron and Freeman, use a second dimension to measure corporate cultures. This second dimension distinguishes between external orientation and differentiation and emphasis by focusing on internal orientation and integration. Together, the resulting four cultural dimensions are; clan, hierarchy, adhocracy and market, forming the framework of competing values (Herzog and Leker, 2010).

The Competitive Values Framework was originally developed from research into the main indicators of effective organisations. The framework was constructed to examine:

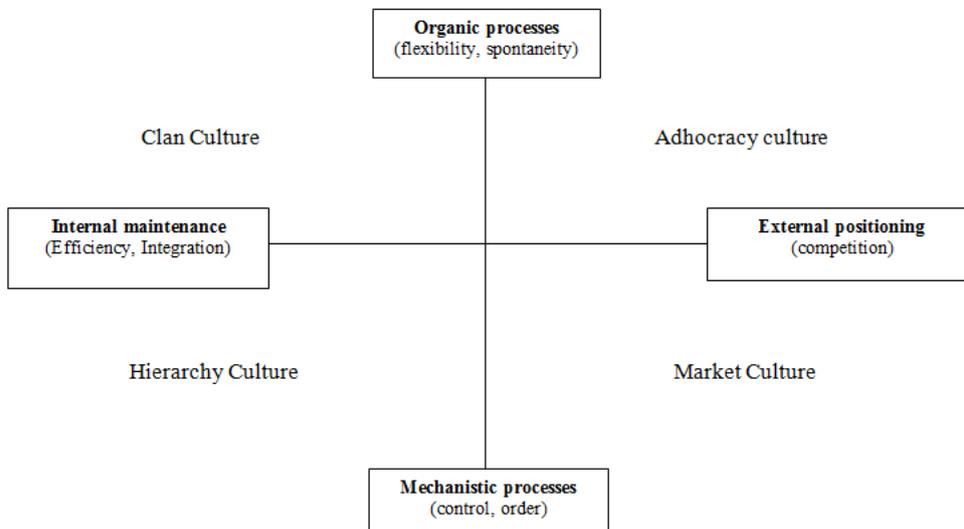
- The main criteria for determining if an organisation is effective or not
- Key factors those define organisational effectiveness
- Judgement of an organisation to be effective or not (indicators for decision)

Two big dimensions emerged in which the markers were organized into four main clusters:

First dimension distinguishes effectiveness criteria that emphasize flexibility, discretion and dynamism from the criteria that emphasize stability, order and control. In other words, some organisations are seen as effective if they are changing, adaptive and organic. Others are considered to be effective if they are stable, predictable, and mechanistic.

Second dimension distinguishes effectiveness criteria that emphasize internal orientation, integration, and unity from criteria that emphasize external orientation, differentiation and competition. In other words, some organisations are thought to be effective when they have compatible internal features. Others are considered to be effective if they focused on interacting or competing with others outside their borders. These two dimensions together form four quadrants and each presents a set of separate organisational activity indicators (Cameron and Quinn, 2005). The competing values framework assesses the organizational culture by six items as 'criteria of success', 'dominant characteristics', 'management of employees', 'organisation glue', 'organisational leadership', 'strategic emphases'. This method gives the chance to identify the culture type for each individual.

Figure 1. Types of Organisational Culture in the Competing Values Framework



(Source: Herzog and Leker, 2010, 67)

The Hierarchy Culture

Procedures governing what people do in this culture type. Effective leaders are good coordinators and organizers. It is important to maintain an organisation that operates smoothly. The long-term concerns of the establishment are stability, predictability and efficiency. Official rules and policies bring the organisation together. Large organisations and government agencies are often governed by a hierarchy culture as evidenced by a large number of standard procedures, multi-hierarchical levels and rule reinforcement emphasis. However, even in small organisations like McDonald's restaurant, a hierarchical culture can dominate. For example, most employees in a typical McDonald's restaurant are young people who have never been trained or have no work experience, and the most distinctive feature of the job is the uniformity of the products in all areas. Important values are the centre of maintaining efficient, reliable, fast, smooth flowing production (Cameron and Quinn, 2005).

The Market Culture

Another form of organisation became popular in the late 1960s when organisations faced new competitive challenges. This form was based on very different assumptions when it is compared to hierarchy. Organisational researchers have identified alternative activities that form the basis of organisational effectiveness. The most important of these is the transaction cost. The new design was referred to as a market format. Marketplace is not synonymous with marketing functions or consumers on the market. On the contrary, it means a type of organisation that functions as a market itself. It is directed to the outside rather than the interior. Suppliers focus mainly on transactions with (mostly) external election regions, such as customers, contractors, license holders, trade unions and regulators. Unlike a hierarchy in which internal control is maintained by rules, specialized work and central decisions, the market operates through economic market mechanisms consisting of major currency changes. In other words, the main focal point of the markets is to make transactions (shopping, sales, contracts) with other electoral districts to create a competitive advantage. Profitability, bottom line results, strength in market niches, stretch targets

and secure customer bases are the main objectives of the foundation. Not surprisingly, the core values that dominate market-based organisations are competitiveness and productivity. Competitiveness and productivity in market organisations are provided by a strong emphasis on external positioning and control. Leaders are hard-driving producers and competitors in this culture type. They are tough and demanding. The glue that holds the organisation together is a winning statement. Long-term concerns are towards competitive actions and reaching stretch targets. Success is defined in terms of market share and penetration. It is important to go beyond competition and market leadership (Cameron and Quinn, 2005).

The Clan Culture

A third ideal organisation is represented as clan culture. This is called a clan because of its similarity to a family-type organisation. Shared values and targets have permeated into compliance, cooperation in clan-type firms. They looked like a very large family of economic assets. Typical features of clan-type firms are teamwork, employee engagement programs, and corporate commitment to employees, rather than hierarchical rules and procedures or competitive profit centres of markets. A clan culture empowers its employees and facilitates their participation, commitments and loyalty, while some of the key assumptions are that the environment is best managed through teamwork and employee development, that the customer is considered the best partner, and that the organisation is in the process of developing a humane working environment. This culture provides a sincere place to work where people share too much of themselves. It's like a large family. Leaders are considered mentors, and perhaps even parental figures. The organisation is organized with loyalty and tradition. Commitment is high. The organisation emphasizes the long-term benefits of individual development, which are high commitment and moral importance. Success is defined by internal climate and anxiety for people. The organisation team puts a premium on the work, participation and consensus (Cameron and Quinn, 2005).

The Adhocracy Culture

As the developed world moved from the industrial to the age of contemporary knowledge, the fourth ideal type of organisation emerged. It is the most reactive organisational form to hyper-violent, ever-accelerating conditions that increasingly symbolize the organisational world of the twenty-first century. Along with the rapidly decreasing half-life of product and service advantages, different sets of assumptions were developed from the other three organisational forms. These assumptions are that organisations are mainly engaged in the development of new products and services and preparing for the future, and that the greatest task of management is to strengthen entrepreneurship, creativity and the environment. The root of the adhocracy word is transient, implying something temporary, specialized and dynamic. Most people are working in a special task force or committee, which departs from the task when the task is completed. The adhocracy organisation can often be found in industries such as aviation, software development, think-tank consulting and filmmaking. An important challenge for these organisations is to produce innovative products and services and to quickly adapt to new opportunities. Unlike markets or hierarchies, there isn't a central power or authority relationship. Instead, power flows from person to person or task team to task team, depending on which problem is eliminated. Emphasis on individuality, risk taking and predictability of the future is high as almost everyone in adhocracy (Cameron and Quinn, 2005).

It is a dynamic, entrepreneurial and creative workplace. People stick around and take risks. Leadership can be defined as effective, visionary, innovative and risk-focused. The glue that holds the organisation together is devoted to experiment and innovation. Emphasis is to be the pioneer of new information, products and services. It is important to be prepared for change and to meet

new challenges. The reason for the long-term existence of the establishment is rapid growth and new sources. Success is to produce unique and original products and services (Cameron and Quinn, 2005).

In the scope of this research, the effects of culture types on innovation system dimensions will be assessed and the dominant culture types will be identified. Since there hasn't been this type of investigation in the existing literature, it will be beneficial to run these analyses on the most innovative companies to draw a big picture on the organisational culture and internal innovation system relationship.

Methodology

Measuring Innovation

Measuring Innovation has been a complex issue since the beginning. Mainly there are 3 outstanding approaches to innovation measurement in literature. The first approach focuses on measuring innovation by the inputs as research and development investments and the outputs as patents. It is clear that these inputs and outputs are important dimensions to understand the research and development efficiency of the companies but can they wholly represent the innovation for a company? Based on an analysis of the top 1,000 global innovation spenders (Booz, 2005) shows us that there hasn't been a direct relation with research and development spending and innovation output. On the other hand, second approach focuses on measuring innovation through financial outputs like profitability and revenue increase. Also, there are much profitable company with few innovations. Lastly third approach focuses on the impact and uniqueness of innovation. We also see that there are much companies which had been shining for few periods with considerable innovations but then disappeared according to unsustainable innovation systems.

Important amount of literature has criticized the measurement of innovation through R&D investments and R&D intensity. Criticisms generally have focused on the expectations to reach more innovativeness by spending more on R&D. It has been accepted that R&D has had a considerable effect on innovation. The nature of spending on R&D can differ from sector to sector. Pharmaceutical, automotive, high-tech etc. sectors always require much R&D spending for the companies to survive. Innovation practice can be defined as a non-linear, complex, collaborative and multi-level process adapted to innovation systems. Since non-technological forms of innovation increasingly outstand to serve to the companies' economic success, we cannot just measure innovation through R&D values (Kirner, *et al*, 2009).

Since our aim is to determine the most innovative companies of the World. We have taken all the measurement methods into consideration by including 6 innovation ranking organisations' lists starting from 2010. This has given us to understand the companies' innovation level with more than one dimension. We defined a balanced method constructed on the 6 innovation ranking organisations.

Most Innovative Companies' Rankings

Boston Consulting Group

Boston Consulting Group's ranking methodology is constructed on a survey applied to senior executives from various industries in every region worldwide and analysis of the selected financial metrics. There are three outstanding financial metrics considered during ranking process:

- Total shareholder return (TSR)
- Revenue Growth
- Margin growth

Since these financial metrics are considered, respondents of the survey's votes determined a big percentage as 80% of the ranking. Total shareholder return (TSR) determined %10, revenue growth determined 5% and margin growth determined 5%.

Boston Consulting Group revised their methodology in 2015 to have a more robust ranking. The respondents were asked to rank the most innovative companies both inside and outside their industry. The distribution of the results was applied as below:

- Within their industry accounted for 30%,
- Outside their industry accounted for 30%
- Three-year TSR accounted for 40%.

This distribution was applied in the aim to have a better balance of subjective and objective measures and simplify the financial outputs. Also, BCG assigned start-ups a three-year TSR for the top-50 analysis to avoid disadvantaging new companies with high valuations that promised strong returns but had not had a public offering. They defined start-ups as private companies founded after 2001. The TSR they used to reflect the average three-year TSR for companies that had a market capitalization of more than \$1 billion, had an initial public offering between 2010 and 2012, and were founded after 2001 (Boston Consulting Group, 2017).

Boston Consulting Group's ranking methodology includes both qualitative and quantitative criteria to have a balanced result on world's most innovative companies.

Thomson Reuters

Thomson Reuters Top 100 Global Innovators recognizes the most innovative companies in the world according to a series of patent-related metrics that get to the essence of what it means to be truly innovative. The Intellectual Property & Science business of Thomson Reuters prepares the list using proprietary data and analysis tools (Thomson Reuters, 2017). Thomson Reuters' main criteria of analysis are below:

Volume: It mentions the companies with considerable amount of innovation. This analysis covers the companies with 100 or more innovation patents from the most recent five years. A unique invention is defined as the first publication of a patent document in a new technology, drug, business process, etc. In DWPI, these are called "basic" patents. Derwent World Patents Index ® (DWPI) is the world's most comprehensive database of enhanced patent documents. Subject experts from Thomson Reuters analyse, abstract and manually index every patent record.

Success: It costs much to apply for patenting of an innovation through one or more patent offices. Not all patent applications are able to succeed the processes and are granted. The success metric measures the ratio of inventions described in published applications (those patents which are filed and publicly published by the patent office but not yet granted) to inventions protected with granted patents over the most recent five years.

Global: Protecting an invention in major world markets is an indication of the significant value a company places on its intellectual property. The number of inventions that have quadrilateral patents in their patent families, according to the Thomson Reuters Quadrilateral Patent Index, was calculated to create a ratio that shows which companies place a high value on their portfolios in major world markets. The quadrilateral patent authorities comprise the Chinese Patent Office, the European Patent Office, the Japanese Patent Office and the United States Patent & Trademark Office.

Influence: The impact of an invention "down the line" can be determined by looking at how often it is subsequently cited by other companies in their inventions. Through the Thomson

Reuters Derwent Patent Citation Index database, citations to each organisations' patents were counted over the most recent five years, excluding self-citations (Thomson Reuters, 2013).

Forbes

Forbes has their own ranking criteria called "Innovation premium". The innovation premium is defined as the proportion of a company's market value that cannot be accounted for from the net present value of cash flows of its current products in its current markets. It's the premium; the stock market gives a company with the expects of the new offerings' launches and the entry to new markets that will generate even bigger income streams.

The Innovation Premium is not about the stocks' expense, it's about how much value investors value the stock above and beyond what it's already delivering. Therefore, The Innovation Premium reflects investors' expectations that more is expected. It is calculated first by projecting the cash flows a company produces from its existing businesses without any growth and look at the net present value (NPV) of those cash flows. This base value of the existing business is compared with the company's current total Enterprise Value (EV): Companies with an EV above their base value have an innovation premium built into their stock price (Forbes, 2016).

Fast Company

Fast Company doesn't use a quantitative methodology to derive the rankings. Selection is subjective according to the uniqueness of the development. When we look to the methodology of Fast Company on 2016 rankings, we see that they partnered with Quid, a San Francisco-based start-up whose software can read millions of news articles, blog posts, company profiles, and patents—and offer immediate insight by organizing that content visually. A team of researchers created topographical maps of innovation across more than 40 sectors of the economy to identify the most relevant trends—along with the companies instigating or best capitalizing on them. Fast Company supplemented the ideas Quid surfaced with the reporting of their own team to vet them (Fast Company, 2016).

Strategy& (formerly Booz& Co)

Strategy& ranks the companies according to two criteria's; first one is the world's biggest R&D spenders and the second one is the companies considered to be the leading innovators according to the survey applied worldwide to senior R&D executives/innovation leaders and performance drivers analysed. R&D spending is the amount spent on R&D investments declared by the companies. Performance drivers mention the revenue growth per R&D investment (Jaruzelski *et al.*, 2013).

MIT Technology Review

MIT Technology Review's selection criteria on most innovative companies focuses on three aspects:

- Whether companies launch extremely innovative technologies and services
- The effectiveness of the commercialization of companies' innovations
- Whether companies' innovations change the competition pattern in the industry

Their editors pick the 50 companies that best combine innovative technology with an effective business model (MIT Tech, 2016).

These 6 ranking organisations' methodologies will be base for selection and scoring of the most innovative companies of the world.

Data Scope

Regarding to the 6 ranking organisations publishes; 7 'Top 10' lists, 27 'Top 50' lists, 6 'Top 100' lists and overall 2043 appearances were analysed. The additional 23 appearances came from Fast Company listings because they gave 19th place to 7 companies, 22nd place to 2 companies, 32nd

place to 2 companies, 34th place to 3 companies, 44th place to 4 companies in 2013 list and 20th place to 3 companies, 24th place to 5 companies, 43rd place to 5 companies in 2014 list. Also, all companies in these places were taken into consideration. Since our scope was defined as the ‘most of the most innovative companies’, we concentrated on ‘Top 50’ listings. Because of this reason, we took the ‘Top 50’ rankings from Forbes although they had provided ‘Top 100’ for the years 2011, 2014, 2015, 2016. Thomson Reuters provided Top 100 lists 2011 to 2016 were included to analyses but it won’t be standalone criteria since they haven’t applied ranking between these 100 companies in their yearly listings.

Table 1. Rankings Included to Research

	2010	2011	2012	2013	2014	2015	2016	2017
Boston Consulting Group	Top 50	Not Available	Top 50	Not Available				
Strategy&	Top 10	Top 10	Top 10	Top 10	Top 10	Top 10	Top 10	Not Available
Fast Company	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50
Forbes	Not Available	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50	Not Available
MIT Techonology Review	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50	Top 50	Not Available
Thomson Reuters	Not Available	100	100	100	100	100	100	Not Available

Scoring and Selection Methodology

The company took the 1st place in list, took 50 points and the 2nd placed company took 49 points and all scoring were applied in this way until the company in the 50th place took 1 point for the related listing of the related year. This method was used for all rankings and all years. It was also applied to ‘Strategy&’ rankings those consisted of only top 10. The companies remained in these rankings took 50 to 41 points. This scoring methodology had exception for Thomson Reuters’ lists. Thomson Reuters lists were just scored for the companies which remained in other rankings. The scoring was applied as standard 50 points for each company’s appearance in Thomson Reuters’ lists.

This scoring methodology was applied for all the companies in the lists. After the scoring execution, consolidated pilot table was provided including the parameters below:

- Company Name
- Company’s Origin Country
- Company’s Appearances in The Lists
 - According to Years
 - According to Ranking Organisations
- Company’s Calculated Score for Each Ranking Organisation
- Company’s Sum of Appearances for Each Ranking Organisation
- Company’s Overall Appearances
- Company’s Overall Score

These parameters were calculated for each company with the goal to understand company level innovativeness. Since we identified the ‘origin country’ for all companies, we also used this consolidated data for national level innovativeness analysis which is another phase of this study. We needed to implement a selection methodology following the completion of the overall scoring. This selection methodology was conducted to include the 3 main criteria below:

- Variety of Innovativeness
- Sustainability of Innovativeness
- Degree of Innovativeness

The selection methodology including the criteria below was identified to ensure the coverage of the 3 main criteria above:

- Companies took place at least 7 times in the lists of the organisations which apply ranking (Thomson Reuters provides Top 100 list but doesn't rank).
- Companies took place in the lists of at least 2 different ranking organisations which apply ranking
- Companies took place in the lists of ranking organisations which apply quantitative criteria

Application of this selection methodology provided a balanced view to analysis in the aim of identifying the 'most of the most innovative companies' of last 7 years. Also, we provided another list of 17 companies from various countries in the aim of comparison. This list included the selection criteria below:

- Ranked as One of the World's Most Innovative Companies At least One Time
- Ranked as One of the Turkey's Most Innovative Companies
- Company with Sustainable Increase in Revenue and Profit
- Company in Fortune 500
- Start-up Innovative Company
- Innovative Company from Emerging Market

This innovative companies set include companies from various countries including USA, Germany, India, United Kingdom, France, Sweden and Turkey. We will keep the companies' names confidential, since all data on them were gathered from first hand with our questionnaire and interviews. High level information of these companies can be found in the table below to understand the profile of them.

Table 1. Innovative Companies' Specifications

Country	Business	Highlights
Turkey	IT Applications & System Development and System Integration	Listed in 'Fast Growing Company List' of a global consulting Company, awarded as 'Best Performing Company'
USA	Technology for electronic payment transactions and value-added services at the point-of-sale.	Delivers innovative payment solutions in 150 countries, listed in the 'Top 10 payment innovator' list in 2015.
Turkey	Game Software/Applications	One of the fastest growing mobile gaming companies in the world.
Turkey	Automotive	Reached the highest sales income in its history in 2015 and recorded a net sales income of 10 billion TL with a 33% increase compared to the previous year and a net profit of 831 million with a 45% increase.
Turkey	Household Appliances Manufacturer	Active in more than 100 countries including China and the United States, operates 15 production plants in Turkey, Romania, Russia, China, South Africa and Thailand, has been listed in 'The Top Innovator Companies of Turkey'.
USA	Multinational Conglomerate	Produces a variety of commercial and consumer products, engineering services and aerospace systems, ranked among the 100 companies in the Fortune 500.
USA	Computer Software	Has more than 420,000 customers and deployments in more than 145 countries, took place among 100 of the 'Top Innovative companies' list in 2014 and 2015.
UK	Professional Services	One of the largest professional services firms in the world.

Turkey	Telecommunications Software	Has completed an array of R&D projects with universities which are certified and approved by independent institutions, has registered a significant number of research patents and contributed to the specifications of international standardization bodies.
Sweden	Household Appliances Manufacturer	World's one of the largest appliance maker,
Germany	Computer Software	Has regional offices in more than 100 countries, has been listed in the 'Most Innovative Companies of the World'
India	IT Solutions & Services	Start-Up Software company
Turkey	Automotive	Automotive parts supplier with exporting 50% of our products to Europe, Middle East, North / South America and Far East countries.
USA	Automotive	An automotive producer with being one of the top 3 exporting companies of Turkey.
USA	Professional Services	One of the leading professional services firms in the world.
Turkey	Online Retail	One of the leading e-commerce company.
France	Information technology consultancy	Multinational information technology consulting company

Instrumentation

Assessing Internal Innovation Capacity

The internal innovation system dimensions, which can be explained as 'the capability to innovate' (Neely, Hii,1998), will be also called as 'internal innovation capacity' in this research. Measurement method was constructed to identify the degrees of the company level innovation system dimensions. We consolidated 7 dimensions from literature, which formed internal innovation capacity as:

- Innovation Leadership
- Innovation Motivation
- Innovation Strategy
- Knowledge Management
- Innovation Culture
- Innovation Resources
- Innovation Process

A questionnaire was constructed for the assessment of these dimensions' existence levels in the company. The questions were presented in a Likert-scale way to understand the degree of every dimension. 51 questions were asked to measure the 7 dimensions of company internal innovation capacity; Innovation Leadership (6), Innovation Motivation (5), Knowledge Management (7), Innovation Culture (7), Innovation Resources (9), Innovation Process (10), Innovation Strategy (7). The construct of the questionnaire was tested from the validity and reliability point of view. The Cronbach's Alpha values of the factors ensured the reliability of the assessment for innovation dimensions and the items measured can be found in the table below:

Table 2. Reliability Values

Factor	Cronbach' s Alpha	Items
Innovation Leadership	0,85	6
Innovation Motivation	0,78	5
Innovation Strategy	0,88	7
Knowledge Management	0,8	7
Innovation Culture	0,8	7
Innovation Resources	0,86	9
Innovation Process	0,89	10

It was also important for us to understand if these dimensions constructed a whole innovation system and appropriate for measurement of it. With aim of this, a correlation analysis was run with the questionnaire data. The correlation analysis showed the strong relationship between these dimensions. These correlation values supported our measurement tool to be considered as a tool for the measurement of a system existence.

Table 3. Correlation Analysis Output

	Innovation Leadership	Innovation Motivation	Knowledge Management	Innovation Culture	Innovation Resources	Innovation Process	Innovation Strategy
Innovation Leadership	1						
Innovation Motivation	0,78083	1					
Knowledge Management	0,60756	0,80444	1				
Innovation Culture	0,64037	0,85450	0,85654	1			
Resources	0,58927	0,78125	0,80131	0,82620	1		
Innovation Process	0,52883	0,74425	0,80729	0,81031	0,75933	1	
Innovation Strategy	0,60620	0,75961	0,85012	0,91976	0,79947	0,78764	1

Measuring Organisational Culture

In an approach to determine the dimensions those provide the value in individual and organisational level ‘The Competing Values Framework’ of Cameron, Quinn and De Graff (2006) was chosen. The Competing Value Framework is among the 40 important frameworks in the business world. A group of thought leaders from leading business schools and companies have been reviewed and tested for more than 25 years. In addition, The Competing Value Framework, which has been used by hundreds of companies around the world today, is a result of the study of factors that explain highly effective organisational performance (Cameron, Quinn and De Graff, 2006). With the use of the "Organisational Culture Assessment Tool (OCAI)", the organisational culture profile can be drawn by specifying the attributes of culture-type culture. In this context, an organisation's general culture profile can be one of the four types among ‘Clan’, ‘Hierarchy’, ‘Adhocracy’ and ‘Market’ which we reviewed in the literature review section.

Organisational Culture Assessment Tool assesses the culture through 6 dimensions with 24 questions by distributing 4 questions to 6 dimensions:

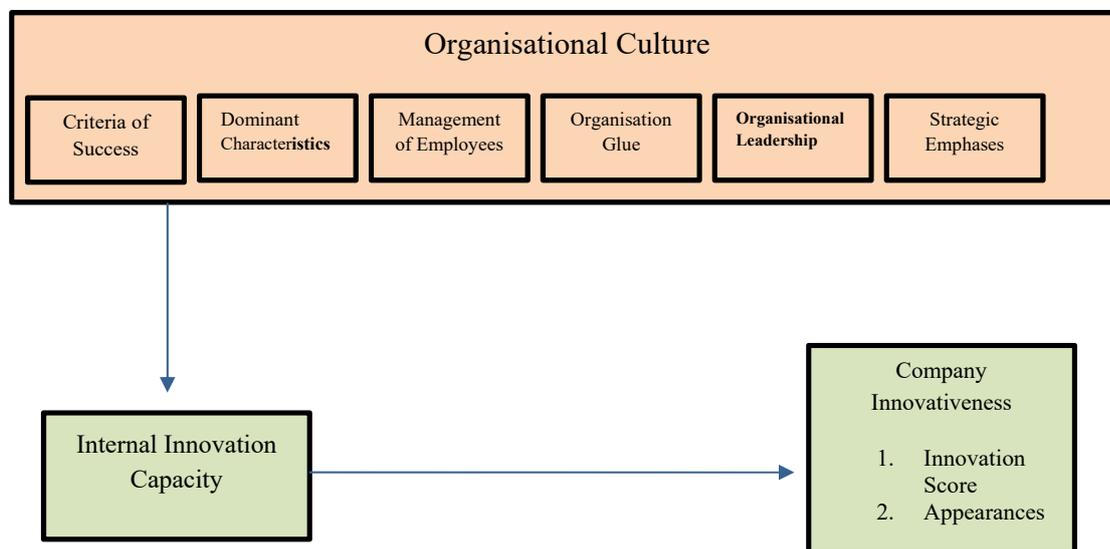
- Dominant Characteristics
- Organisational Leadership

- Management of Employees
- Organisation Glue
- Strategic Emphases
- Criteria of Success

This study covered the measurement of all these dimensions and finally were able to discover the overall weighted average of the existing of 4 culture types in the organisations. This study has a novelty from an implication of OCAI point of view. Responds to questions were gathered with a Likert-scale. This is because of the belief that there can be more than one dominant culture types in organisations, whether between departments of an organisation.

24 questions of OCAI were added to the 51 questions identified to measure internal innovation capacity and the responds were collected with the merged questionnaire which consisted 75 questions.

Figure 2. Research Model



Results

Most Innovative Companies of the World

The company 'Google' is called as 'Alphabet' since they merged all their business activities in this company name. All data mentioned for the companies 'Google' and 'Alphabet' were consolidated under 'Alphabet'.

801 companies worldwide, which took place in the related ranking organisations' lists, during the period in scope of this study were analysed. These 801 companies were classified according to the appearances in each ranking organisations' lists and scored according to their place in the rankings. The highest score appeared to be '1595' and the lowest score appeared to be '1' in the 801 companies set. After wise, the selection methodology was implemented. We identified 30 companies meeting our selection criteria for the most innovative companies. These companies took place at least 7 times in the lists of the organisations which apply ranking with also appearing in the lists of at least 2 different ranking organisations which apply ranking and applying quantitative ranking methodology. 'Apple' stood to be the most innovative company with the score of '1595' and '34' appearances in the lists since 2010. 'Alphabet' took the second place with the score of '1588' and '36' appearances. The third place was taken by 'Amazon' with the score of

'1400' and '32' appearances. 'Apple' and 'Alphabet' s scores were to close. Since our ranking has been based on the score 'Apple' was decided to be the first, even 'Alphabet' appeared in the list 2 times more than 'Apple'.

The top three innovators which are 'Apple', 'Alphabet' and 'Amazon' took places in all 6 ranking organisations' lists. 'Samsung' followed these top three innovators by the score of '1033' and '26' appearances. There were only these four companies able to get score more than thousand. Especially 'Apple', 'Alphabet' and 'Amazon' have considerable gap with the rest of the list. 'Samsung', 'Microsoft' and 'General Electric' can be considered as the strong innovators with so close scores and appearances in the rankings. 'IBM' and 'Toyota' are also sustainable innovators with more than 20 appearances and the scores greater than '800'.

Table 4. Top Most Innovative Companies' Rankings

Ranking	Country	Company	Score	Appearances
1	USA	Apple	1595	34
2	USA	Alphabet (Google)	1588	36
3	USA	Amazon	1400	32
4	South Korea	Samsung	1033	26
5	USA	Microsoft	990	26
6	USA	General Electric	980	25
7	USA	IBM	889	25
8	Japan	Toyota	888	21
9	USA	Tesla Motors	753	18
10	USA	Facebook	712	19
11	USA	Intel	641	18
12	USA	3M	588	15
13	USA	Nike	493	15
14	USA	Netflix	472	13
15	USA	Hewlett Packard	453	11
16	China	Tencent	434	15
17	USA	Procter & Gamble	429	14
18	Germany	Siemens	406	15
19	UK	ARM Holdings	391	9
20	Germany	BMW	358	9
21	USA	Salesforce.com	357	9
22	China	Huawei	321	11
23	China	Baidu	275	8
24	USA	Illumina	243	8
25	USA	Starbucks	189	9
26	USA	Square	181	7
27	USA	Twitter	170	8
28	USA	Cisco Systems	152	7
29	Japan	Fast Retailing	145	9
30	USA	SpaceX	144	8

Table 4. presents the consolidated values calculated from the 6 ranking organisations which provide yearly lists for the world’s most innovative companies. The values are calculated from the lists provided between the years ‘2010’ and ‘2016’ by including ‘7’ years data. Score calculating methodology is unique to this research, which is explained in the methodology section.

Figure 3. Top Most Innovative Companies’ Scores According to Ranking Organisations

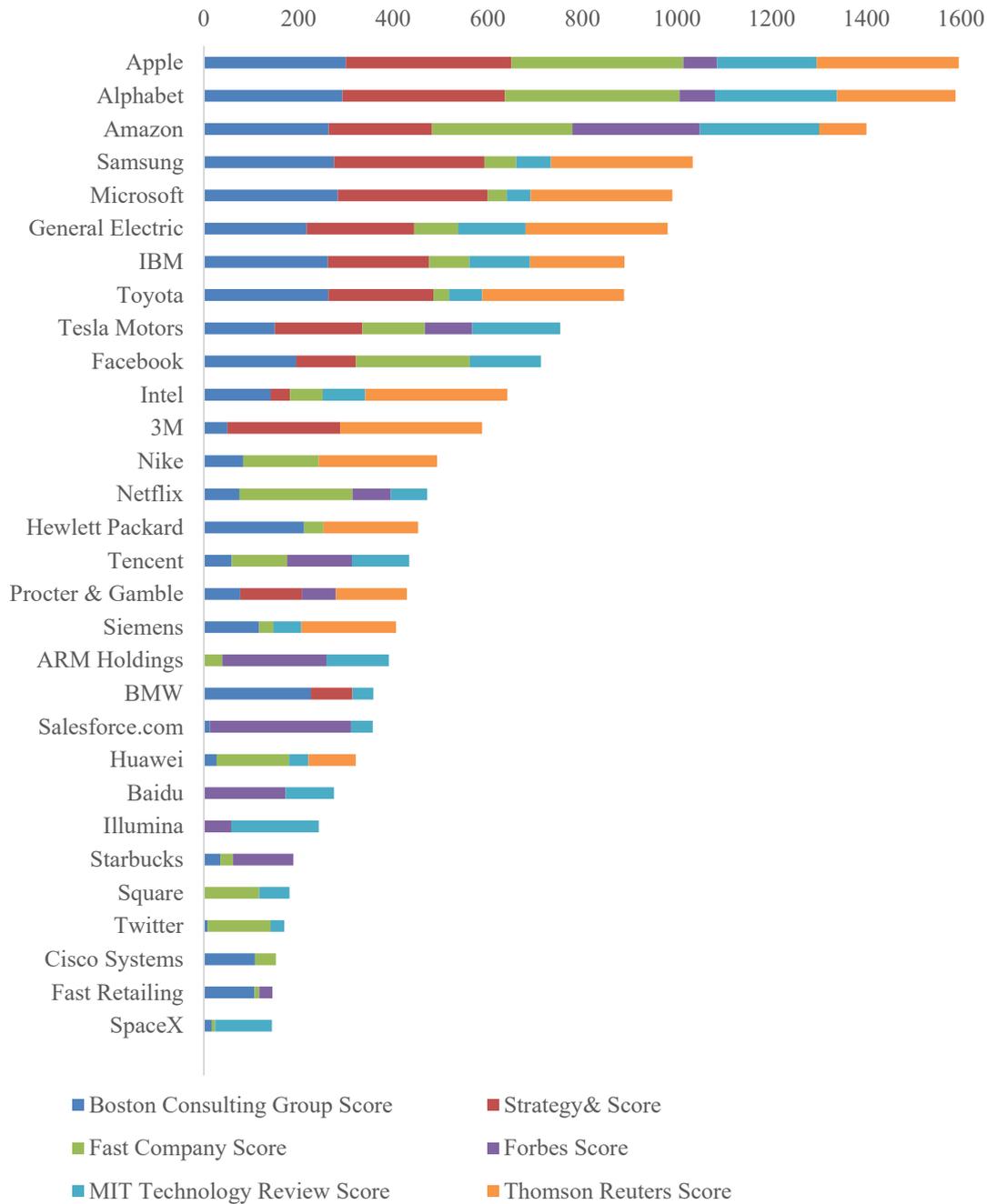


Figure 4. 5 Year vs 10 Year Revenue Performance

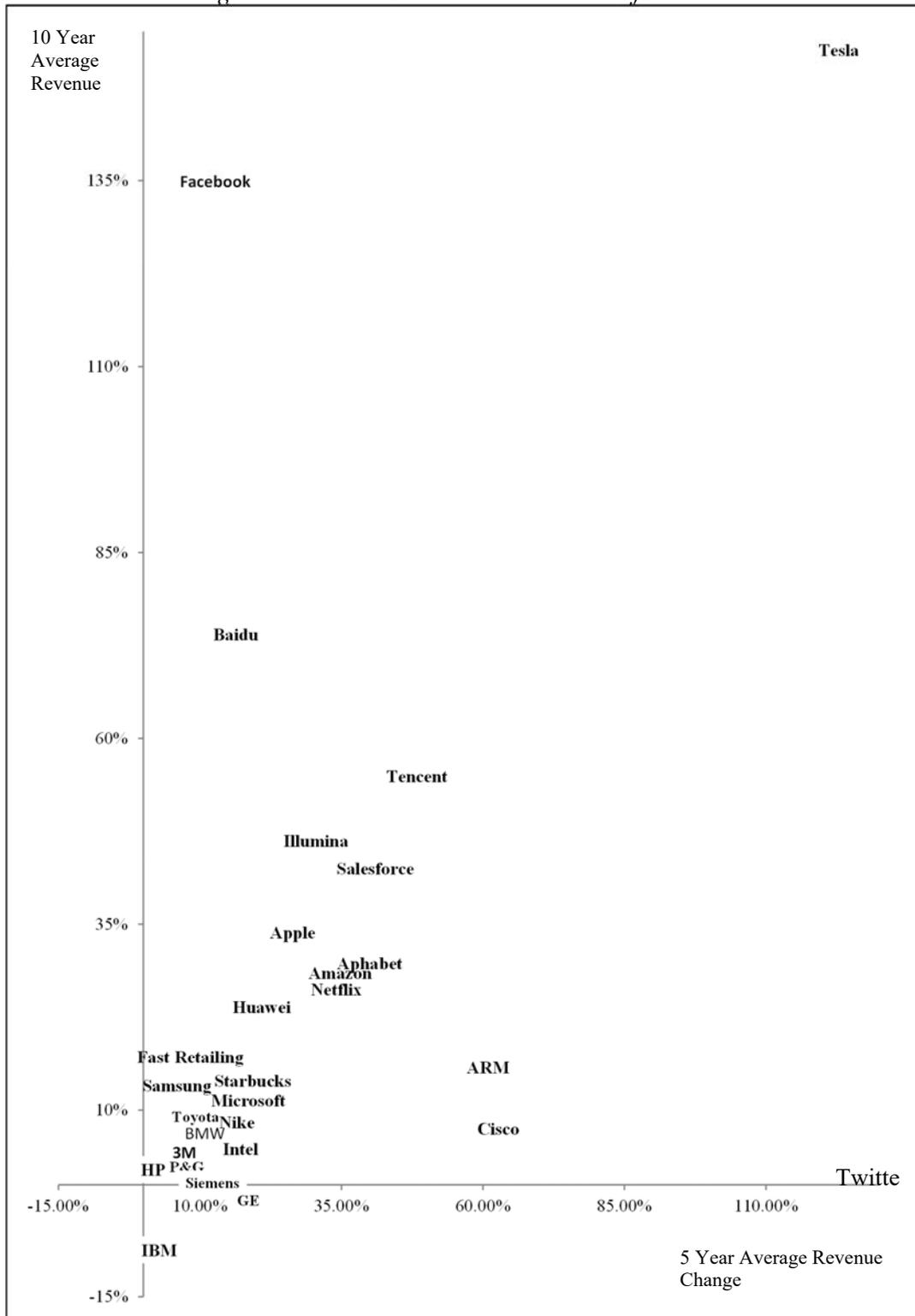


Figure 4. presents us the financial perspective on the world's top most innovative companies. It is important to mention that since these values rely on the annual reports of the companies, we don't have the values for the companies which don't have public shares. Also, we don't have the values for the periods before their shares were offered to public. The data presented for Facebook and Tesla include 9 years and there isn't any data for Square, SpaceX. Twitter has just 5 years' data, since they haven't been publicly traded.

The figure presents us some outstanding issues on especially 'disruptive innovation'. Tesla appeared to be the best performer for 5 year and 10 year periods, although it is not same for profitability because of research and development expenses. Their average research and development spending has been more than %40 of the yearly revenue being the second after Twitter (%69). We can comment that, the companies launching the products and services being the first, outshine with their revenue increase since it must be investigated in detail by relating this to other factors like company age and the period of profitability. This can be a further research in investigating the role of innovation on financial performance.

Internal Innovation Capacity

We have described the Internal Innovation Capacity as the systems and capabilities those the companies can decide and implement on their own. With respect to this description, we analysed the Internal Innovation Capacities of the companies with the tool we constructed for the measurement in 7 dimensions including; Innovation Leadership, Innovation Motivation, Knowledge Management, Innovation Culture, Innovation Resources, Innovation Process and Innovation Strategy. Top Most Innovative Companies were assessed according to these dimensions with our questionnaire. Second hand data were used for the companies which didn't participate to the questionnaire. Dimensions scores were calculated according to the answers which are Likert scale. These answers were converted to number format from 5 to 1.

The calculations were done for each 30 company and afterwards average values were calculated consisting of company values for a consolidated view. Knowledge Management, Innovation Culture, Innovation Strategy and Innovation Motivation presented average values more than 4 out of 5 and appeared to be the outstanding dimensions of the Top Most Innovative Companies. When these calculations were applied to the innovative companies set which included 17 innovative companies, they showed lower degrees on innovation system dimensions. Innovation Leadership appeared to be the highest dimension followed by Innovation Motivation and Knowledge Management dimensions of the innovation system.

The results showed the gaps between the two set of companies. Innovative companies concentrated much on Innovation Leadership when this is the lowest concentrated dimension for the top most innovative companies of the world. Top most innovative companies showed much more performance on the systematic dimensions like implementation of the knowledge management system, building and maintaining the innovation culture and highlighting the awareness to clear and identified innovation strategy for the company.

The values for each set of companies and the gaps between their innovation system implementations are visualized for a better understanding.

Figure 5. Innovation System Dimensions Comparison of Two Set of Companies

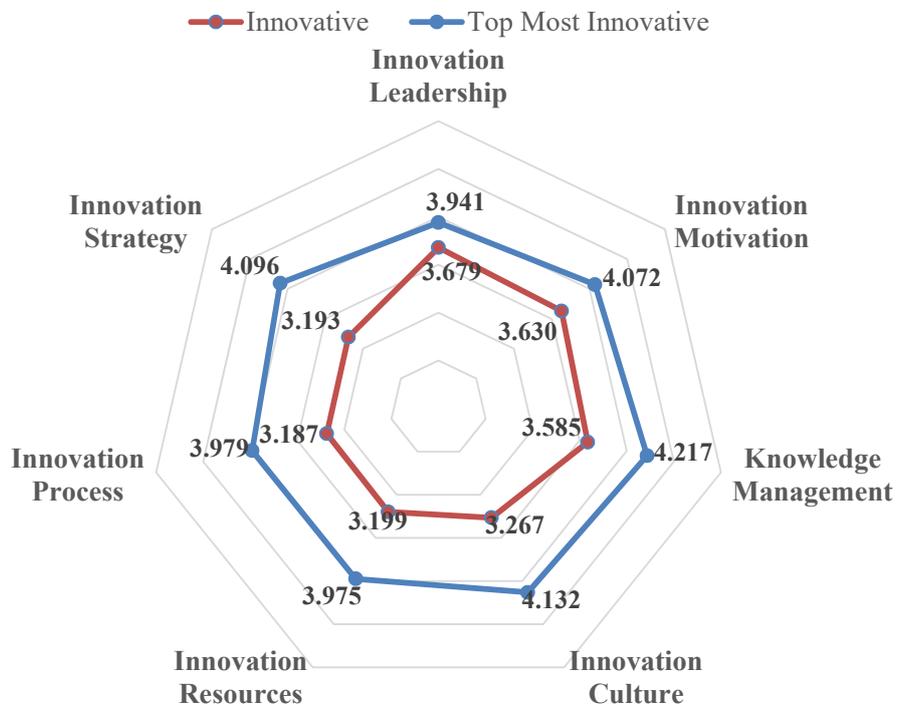
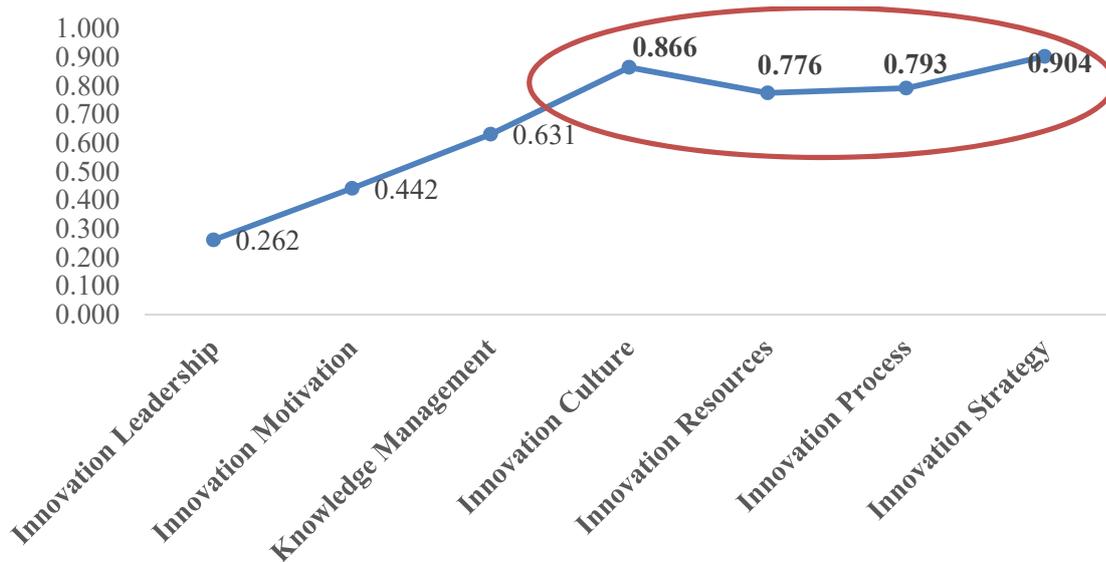


Figure 6. Gaps Between the Two Set of Companies



Average values of the innovation system for the top most innovative companies occurred as 4,059 out of 5 when it occurred as 3,391 out of 5 for the innovative companies. The difference between the highest and lowest dimensions' values appeared to be 0,276 for the top most innovative companies when it was 0,492 for the innovative companies. The top most innovative companies showed a balanced distribution for the concentration on the dimensions.

These differences between two set of companies on the values of the dimensions guided to an analysis on the attributes constructing these dimensions. Following the deep dive analysis to the average responses to the attributes of the two set of companies. Top attributes of the two set were identified. These attributes also, mainly highlighted the innovation system concentration differences of the two set of the companies. The top most innovative companies highly presented a strong attribute on seeing 'innovation a long-term strategy' and putting it on top of their business goals. The degree 4,615 out of 5 can be strongly considered as a high value. They put 'customer value creation' to the second place by concentrating on innovation activities which create value to customers with the aim to meet customer expectations. These set of companies also presented high level of attributes on collecting customer feedbacks which guided their innovation activities. The top most innovative companies' strongest attributes are mainly grouped in the collective dimension which are Innovation Culture, Knowledge Management and Innovation Motivation. The Innovative companies set showed similar performance only in the attribute to consider innovation as a value creation for customers. Customers' expectations are taken into account like the top most innovative companies. The other strongest attributes of the innovative companies are the Innovation Motivation which took first place by the attribute on having the 'desire to create new things and solutions'. The other outstanding attribute appeared to be the Innovation Leadership which included the attribute on the 'support of new attempts on innovative activities'. The respondents mentioned that they didn't afraid of failures on the activities of new product development and new processes since the leadership team supported them and no punishment was in place. It is clear that the top most innovative companies had innovation systems more concentrated on cultural and strategical attributes and higher score on all dimensions of innovation system but there is also a similarity on 'putting customer first' attribute both for two set of companies.

Table 5. Outstanding Attributes of Two Companies Set

Most Innovative Companies	Degree
Innovation is a long-term strategy for us.	4,615
Customer value creation is acknowledged as a major objective of our Innovation activities.	4,452
We have the internal talent to succeed in our innovation projects.	4,304
We have a common and accepted language on innovation.	4,304
We have a report to evaluate innovation projects.	4,289
We have a desire to create new things and solutions.	4,289
Innovative Companies	
We have a desire to create new things and solutions.	4,074
Customer value creation is acknowledged as a major objective of our Innovation activities.	3,862
Our leaders are able to modify and change course of action when needed.	3,773

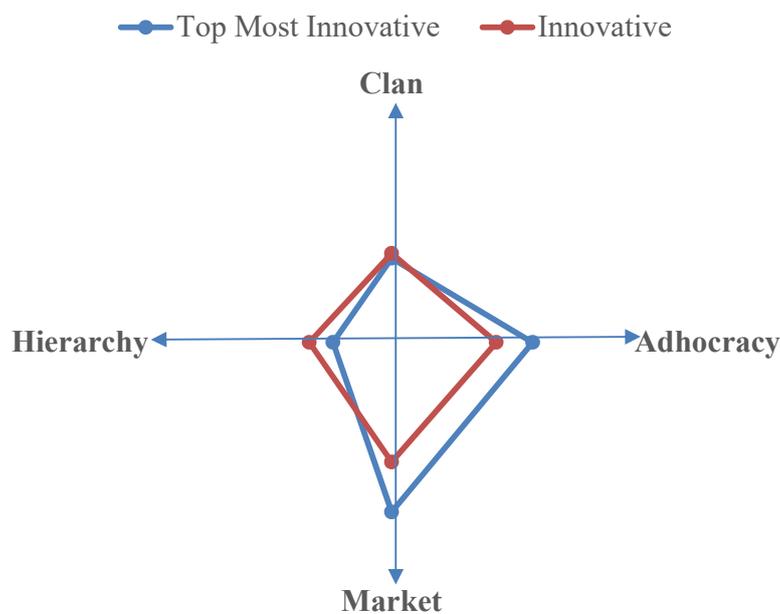
We reward people for value addition to innovation process.	3,769
Our leaders support us during successes and failures.	3,756
Learning is for supporting existing core competencies and create new ones, for us.	3,752

Organisational Culture

Much studies mentioned the effect of organisational culture on innovation implementation as it is highlighted in literature review section. As a novelty of this research, organisational culture types of the top most innovative companies and innovative companies were identified in ‘competing values framework’ point of view with an additional Likert-scale measurement approach. The existence level of all culture types was calculated by the framework instead of just identifying ‘existing’ and ‘preferred’ culture types. The aim has been to understand the correlation between each culture type and each innovation system dimension. The measurements for the top most innovative companies based on first-hand and second-hand data meanwhile the measurements for the innovative companies based on the first-hand data, directly populated from the survey tool of the framework.

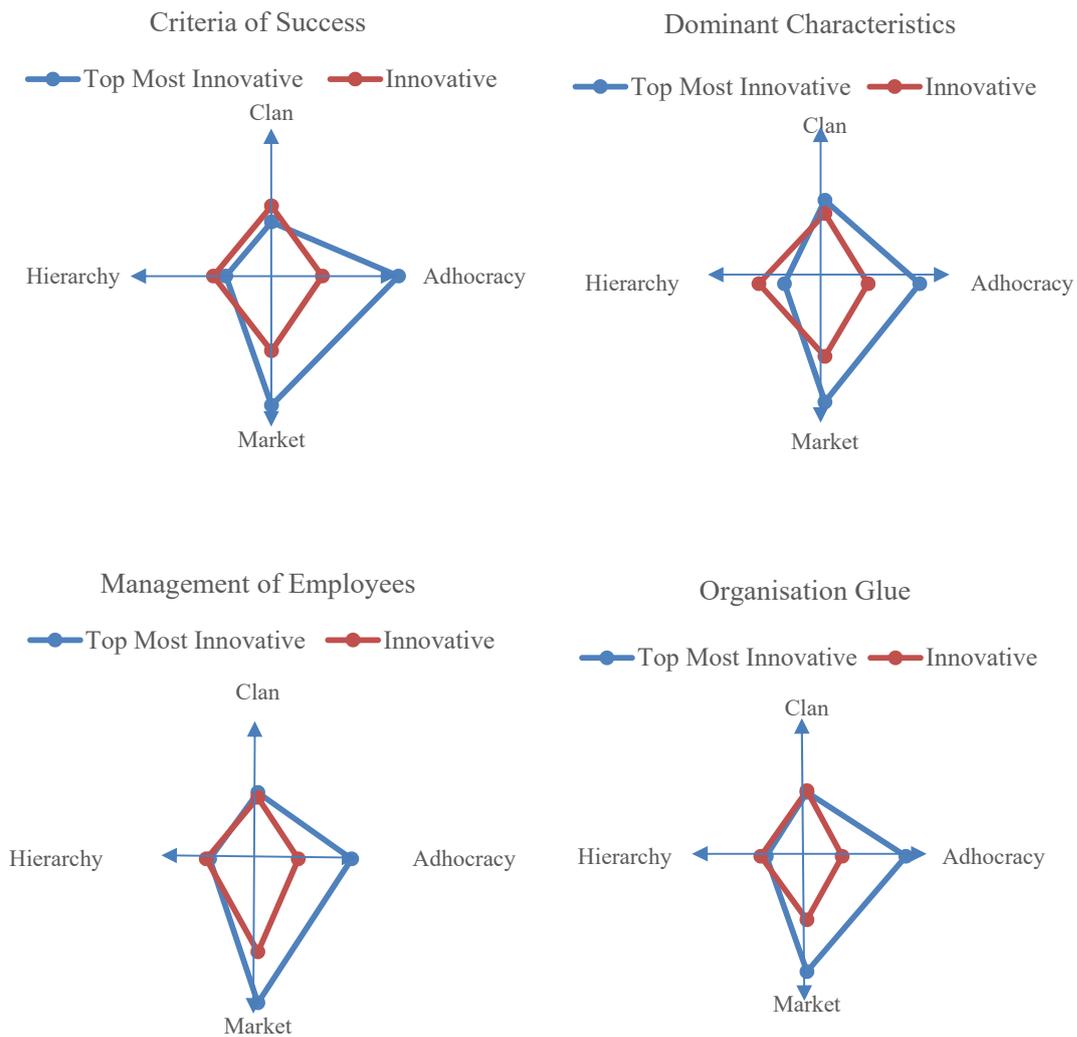
Culture types were identified overall and for each dimension of the culture. The overall culture for the top most innovative companies appeared to be the ‘market’ culture which was followed by ‘adhocracy’. The lowest culture type was measured as ‘hierarchy’ followed by ‘clan’. Market culture’s existence in the top most innovative set was very strong with the value of 4,328 out of ‘5’. The following culture type; adhocracy had the value of 4,009 out of 5. Clan culture had the value ‘3,408’ and hierarchy had the value ‘3,128’. The same measurement was also applied for the other set of companies which include innovative ones. It was seen that, the ranking between the culture types didn’t change. Market culture was first with the value of ‘3,789’, adhocracy was second with ‘3,620’, clan was third with ‘3,460’ and hierarchy was the last with ‘3,381’. In the innovative companies set, clan and hierarchy appeared to be higher than the top most innovative companies set, meanwhile market and adhocracy were lower.

Figure 7. Overall Existence of the Cultural Types



The analyses were also run for all dimensions of the organisational culture. The general picture highlighted the dominance of 'market' culture again. Especially for the top most innovative companies set, market culture appeared to be the leading culture type or all dimensions of organisational culture. Innovative companies differed from the top most innovative companies on Organisation Glue, Organisational Leadership and Strategic Emphases dimensions of the organisational culture by presenting the higher degree with 'clan' culture type. Also, market culture was the dominant for the rest of the dimensions for the innovative companies set, too.

Figure 8. Existence of the Cultural Types by Cultural Dimensions



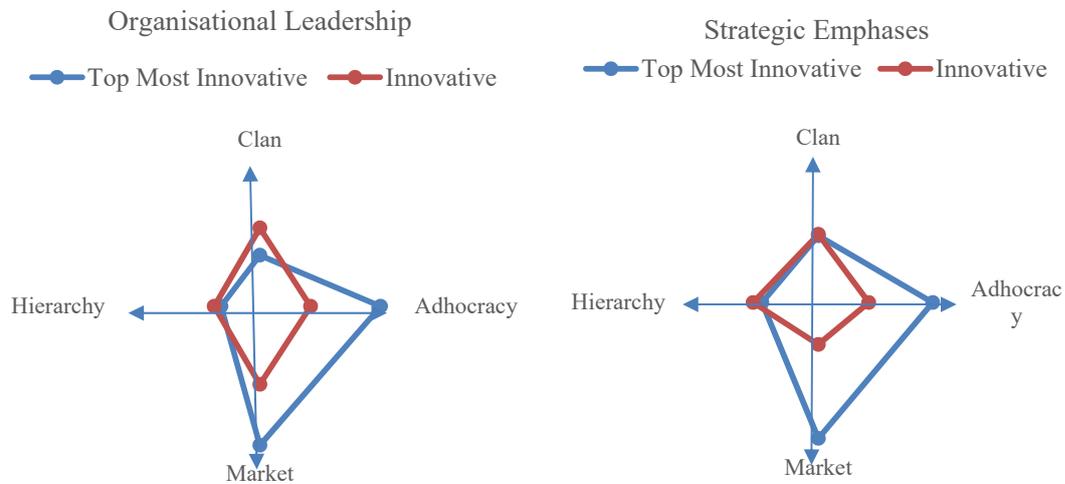


Table 6. Existence of the Cultural Types by Cultural Dimensions by Values

Dimension	Company Set	Clan	Adhocracy	Market	Hierarchy
General Culture	Top Most Innovative	3,408	4,009	4,328	3,128
	Innovative	3,460	3,620	3,789	3,381
Criteria of Success	Top Most Innovative	3,248	4,244	4,289	3,126
	Innovative	3,470	3,198	3,535	3,297
Dominant Characteristics	Top Most Innovative	3,700	3,852	4,200	3,078
	Innovative	3,510	3,116	3,545	3,442
Management of Employees	Top Most Innovative	3,400	3,759	4,448	3,148
	Innovative	3,333	3,044	3,759	3,193
Organisation Glue	Top Most Innovative	3,493	4,022	4,289	3,126
	Innovative	3,517	3,043	3,486	3,211
Organisational Leadership	Top Most Innovative	3,193	4,122	4,381	3,022
	Innovative	3,562	3,182	3,557	3,113
Strategic Emphases	Top Most Innovative	3,415	4,056	4,363	3,267
	Innovative	3,435	3,186	3,075	3,387

Effects of Organisational Culture Dimensions on Internal Innovation System Dimensions

The relationship between organisational culture dimensions and innovation system dimensions were analysed as one of the outstanding aim of this dissertation. Since we assume that organisational culture is shaped from the beginning of the companies, it is a challenging factor for a successful implementation of the innovation system. This relationship has been highlighted by most of the studies. But a uniqueness of this dissertation, the effects of all dimensions of the organisational culture on innovation system dimensions were measured as defining organisational culture dimensions as independent and innovation system dimensions as dependent variables. The regression analysis was run, including 28 independent variables and 7 dependent variables with this aim. 28 independent variables came from the all variations of all dimensions. These variations were the existence of four culture types (Clan, Adhocracy, Market, Hierarchy) for all dimensions. The dataset was consisted of the 47 companies' data which included the average values for all dimensions' existence. The results of the analysis provided significant correlation levels according to the effects of organisational culture dimensions on innovation system dimensions.

Figure 9. Relationship between Culture and Internal Innovation System Dimensions

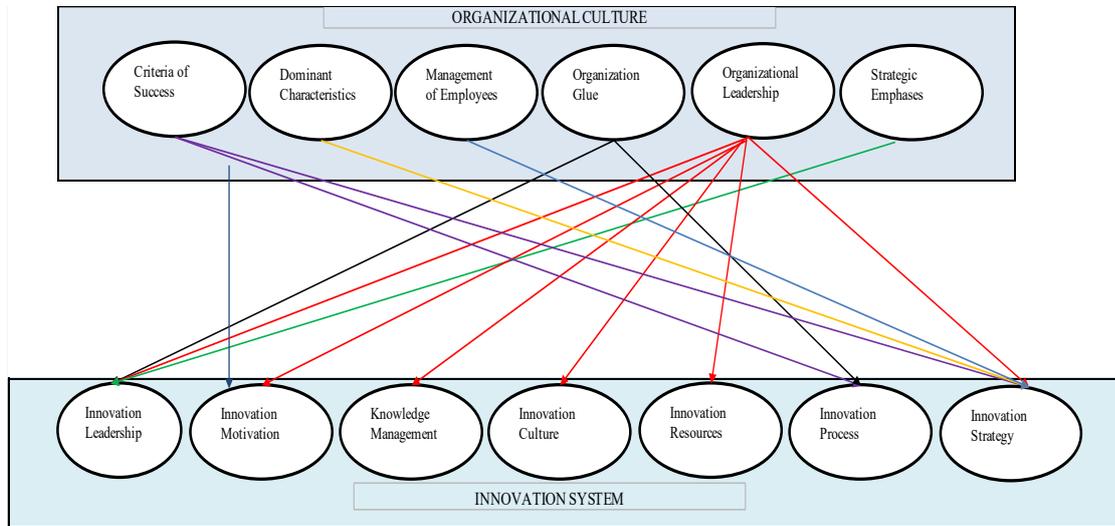


Table 7. Regression Results for All Dimensions

Independent Variable	Significance(π)	Coefficient(β)	Dependent Variable
Criteria of Success (Adhocracy)	0,016	0,484	Innovation Process
Criteria of Success (Adhocracy)	0,0423	0,448	Innovation Strategy
Dominant Characteristics (Hierarchy)	0,0462	-0,352	Innovation Strategy
General Culture (Clan)	0,038	0,335	Innovation Motivation
General Culture (Market)	0,0189	0,256	Innovation Motivation
Management of Employees (Hierarchy)	0,0283	0,282	Innovation Strategy
Organisation Glue (Clan)	0,0124	0,34	Innovation Leadership
Organisation Glue (Market)	0,0499	0,244	Innovation Process
Organisational Leadership (Adhocracy)	0,0225	0,188	Innovation Motivation
Organisational Leadership (Adhocracy)	0,0011	0,347	Knowledge Management
Organisational Leadership (Adhocracy)	0,0032	0,394	Innovation Culture
Organisational Leadership (Adhocracy)	0,0004	0,421	Innovation Resources
Organisational Leadership (Hierarchy)	0,0384	0,244	Innovation Leadership
Organisational Leadership (Hierarchy)	0,0433	0,268	Knowledge Management
Organisational Leadership (Hierarchy)	0,011	0,514	Innovation Strategy
Organisational Leadership (Clan)	0,0072	-0,477	Innovation Strategy
Organisational Leadership (Adhocracy)	0,003	0,573	Innovation Strategy
Strategic Emphases (Hierarchy)	0,0331	-0,274	Innovation Leadership

Figure 10. Overall Coefficients of the Organisational Culture Dimensions



Organisational Leadership appeared to be the most dominant dimension of the organisational culture from the ‘influence on innovation system’ point of view. Organisational leadership presented the highest consolidated coefficient values on innovation system dimensions by ‘adhocracy’ culture type. This influence had the positive correlation with Innovation Motivation, Knowledge Management, Innovation Culture, Innovation Resources, Innovation Strategy dimensions of the innovation system. On the other hand, ‘Hierarchy’ attribute of organisational leadership had positive correlation with Innovation Leadership, Knowledge Management, Innovation Strategy. The only negative correlation appeared to be the ‘clan’ culture type of organisational leadership. This type showed negative correlation with innovation strategy dimension of innovation system.

Discussion

This research’s main goal has been to identify the underlying dimensions of the innovation success of the world’s most innovative companies. It is clear that sustainable innovation success cannot be explained by coincidences or just depending on one man. With this aim we developed a methodology to identify sustainable innovator companies. We scored them in a unique way based on the world’s most innovative companies’ rankings. We included 6 ranking organisations’ list to have balanced view depending on more than one criteria. The scoring methodology based on appearances and ranks, provided us 30 top most innovative companies meeting our success criteria. These 30 top most innovative companies have been our target set to identify outstanding dimensions of their innovation system. On the other hand, 17 innovative companies from various countries were identified and were used for comparison. This comparison showed us the gap on innovation system dimensions’ implementation levels between two sets. A unique internal innovation system assessment tool was used to identify these companies’ internal innovation capability. Internal innovation capability was accepted as the implementation level of the dimensions assessed by this tool. It is also accepted from the beginning that having a proper innovation system cannot be enough to become one of the world’s top most innovative company. There are also other dimensions and factors effecting the companies’ innovation success. Organisational culture was chosen as one of these factors. Organisational culture’s importance on

internal innovation capability has been highlighted many times in the literature but there hasn't been any empirical study showing the relationship in details by concentrating on each dimension of the organisational culture and internal innovation capability. This research provided significant relations between these dimensions for the data available.

Organisational Culture

The dimensions of organisational culture showed significant effects on internal innovation system dimensions. Especially 'organisational leadership' appeared to be the most dominant dimension on internal innovation system dimensions. The leaders shape the culture of the organisation and also those are the leaders who initiate innovation culture in the organisations. Our analyses proved this assumption with an empirical way and significance. When we go through the outstanding results on organisational culture of the top most innovative companies, we see the dominance of 'market' culture on all dimensions of organisational culture in the companies. 'Adhocracy' culture appeared to be the following culture on all dimensions. On the other hand, 'Adhocracy' culture type for 'organisational leadership' dimension showed the greatest positive effect on internal innovation capability. General leadership approach in the top most innovative companies based on 'empowering employees' in their business zone. We should also avoid the confusion on the leadership that leaders are always on the management. The leadership in the organisation can be spread around the organisation in different levels independent from management titles. In the book 'How Google Works', it is suggested for the organisation 'to determine the people having the biggest influence and to organize around them' (Schmidt et.al., 2014). Fostering the innovation in the companies, much depends on the 'leadership' as a catalyst even with the leaders in the management team or the people with leadership skills, accepted and behaved as leaders with their 'expert' power by all around the organisation.

The second dimension needs to be highlighted is the 'Criteria of Success'. Our analyses have shown that, 'Clan' and 'Adhocracy' cultures for the criteria of success of the organisation, presented positive significant relationship on the 'innovation motivation' dimension of the internal innovation system of the companies. Talented resources of the top most innovative companies are most likely to be a part of a team with much collaboration and trust. They prefer supportive people with respectable knowledge in their teams. By the way, they most likely to work with collaboration having a considerable level of freedom in their works. 'Adhocracy' also appears when it comes to the motivators of the work. The criteria of success fostering innovation motivation can be explained as 'having the most unique or newest products/services with strong commitment on teamwork and collaboration'. Adhocracy culture for the criteria of success also effects 'Innovation Strategy' and 'Innovation Process' dimensions of the internal innovation system in positive way. 'Empowered talented resources' reinforce companies' important innovation dimensions. When we declare the concept 'talented resources' we also need to highlight the reality that, top most innovative companies also give much consideration on hiring the top talented people.

There is also an outstanding issue to highlight when we look from the organisational culture point of view, the 'market' culture is the dominant culture both for the 'top most innovative' and 'the innovative' set of companies. The general culture appears to be a culture encourages the competition among the members of the companies. This competition shows itself as a competition on the productivity and creativity with the aim of having on the cutting-edge outputs. It is very evident that the 'top most innovative' and 'innovative' companies strongly put the 'customer' into their centre of innovation activities parallel with the outstanding attribute of 'market' culture. The 'external oriented' culture strongly considers the needs and expectations of the customer with strong feedback mechanism. It is also very well understood that delivering products/services based

on customer expectations, will bring the commercial success.

In addition to the dominance of 'market' culture, 'adhocracy' culture appeared to be the second and supportive culture type in these organisations from the general culture point of view. The general culture is much competitive and demanding from the outputs point of view. But, it must also be highlighted that, leaders and management team provide the working conditions of 'adhocracy' for the teams to achieve strict targets and meet the demands of the leadership. This 'adhocracy' culture has the positive relations with the internal innovation capability of the companies as we mentioned before based on the regression analysis.

There can be also several culture types depending on the work and the necessary conditions. It also appears to be in that way as we also saw in our assessment. Top characteristics of the top most innovative companies can be summarized below:

- Their major focus is 'customer'
- They force the innovation activities to provide output, serving to customer needs
- Competition and commitment to innovate are key motivators
- Their leadership have much ambition on having the cutting-edge outputs
- General culture is based on continuous innovation demand

Internal Innovation Capacity

The tool developed for this research, helped us to assess the internal innovation system dimensions' implementation level of the 'top most innovative' and 'innovative' companies sets. The tool has focused on identifying the implementation level of 7 dimensions forming the internal innovation system. The outstanding issue according to the results for the 'top most innovative companies' set, is the balanced distribution of the implementation level for the dimensions. The average value occurred as 4,06 out of 5 and the lowest value has been 3,941 (Innovation Leadership) where the highest value has been 4,217 (Knowledge Management). When we review the results for the 'innovative companies' set, we see lower average value as 3,39 out of 5. The highest value occurred as 3,679 (Innovation Leadership) and the lowest as 3,187 (Innovation Process). The 'innovative companies' have leadership showing much focus on innovation although the value for that dimension is lower than the 'top most innovative' set of companies. The 'top most innovative companies' have higher implementation level on the long-term concepts like 'process' and 'culture'. 'Top most innovative companies' focus on implementing a structure and methodology on innovation approach. We can highlight that:

- Innovation is a long-term strategy for the top most innovative companies
- Customer value creation is common outstanding
- They believe in their internal talent to succeed in their innovation projects
- They have a common accepted language on innovation
- The awareness of the innovation strategy of the company almost includes all the company
- Commitment is very high on innovation
- Innovation process and culture are owned by every employee in the top most innovative companies. The innovative companies set have presented the outstanding attributes below:
- They have desire to create new things and solutions
- They believe in their leaders in the innovation approach
- Customer value creation is common outstanding

'Customer oriented culture' has influence on both set of companies and they see the innovation as 'value creation' for customers. This is the common attribute for two companies set. The difference

on the internal innovation systems of the companies show itself on the driving of the innovation process. Innovative companies have the motivation and desire on innovation which is fostered by the leadership. Of course, it is not different for the top most innovative companies, too. But, the innovation approach of the top most innovative companies differs on the manner of 'taking the ownership innovation'. In these companies, innovation is seen as the reason of the existence and everybody sees themselves empowered for the innovation leadership in their areas. We can also relate this situation with the higher level of 'adhocracy' in the top most innovative companies. In addition to the innovation approach difference for two sets, it is also important to highlight the biggest gaps for the dimensions of the internal innovation systems of them. The biggest gap occurred on 'Innovation Strategy' and the second biggest gap occurred for 'Innovation Culture'. 'Innovation Process' and 'Innovation resources' followed these dimensions from the difference point of view.

When we compile all these discussions on the results according to the internal innovation system of the two set of companies in order to present a main theme; 'the top most innovative companies' focus on a 'system approach' for innovation process. They strongly focus on implementing and adapting a 'culture' for innovation which is fed by 'adhocracy' culture in order to serve the 'market' culture.

Conclusion

This research has aimed to figure out the factors effecting company innovativeness. The focus has been the top most innovative companies from the beginning. The top most innovative companies were identified with a unique methodology which balanced the innovation criteria of different ranking organisations. As a novelty of this research, unique 'internal innovation system dimensions' assessment' tool was developed relying on literature and statistical validations. The organisational characteristics of these companies were identified with the 'competing values framework' and same assessments both for internal innovation system and organisational culture were applied to another set of innovative companies from various countries which gave us the chance for comparison.

These results of assessments and investigations on internal innovation capacity of a company can propose, for a company with the aim of being most innovative, to equally distribute all the efforts to implement all the dimensions of the internal innovation system. These implementation levels must be 4 out 5 to foster the innovation success. The most innovative companies of the world have focused on all dimensions of the internal innovation system with a balanced distribution level as almost 4 for all dimensions. Giving much more concentration on 'knowledge management', 'innovation culture' and 'innovation strategy' and giving the awareness on the importance of them to all the employees, is the outstanding characteristic of the top most innovative companies. The 'innovation goal' must be accepted by every employee and must be the strongest motivation for the innovation success. It is so clear that, companies must construct an 'innovation culture' first before trying to implement innovation lifecycle practices. An innovation goal just being driven with the leadership, won't give the outstanding results.

The other factor on internal innovation capacity, is the organisational culture of the company. Organisational culture standing in the base of the company, shapes the success of every practice and goal in the company. A striving organisational culture powered by competition and empowerment among the members for providing innovative outputs, supports the internal innovation capacity. The customers' expectations and satisfaction must be in the first place in the hierarchy of goals to succeed in innovation. This research focused on the identification of the top most innovative companies relying on the rankings of the ranking organisations. This can be

considered as a limitation for this research which opens a new door for further research concentrating on analysing the effectiveness of 'input-output ratio'. As another saying: What is the role of being most innovative on financial return and organisational effectiveness? The figure 4 presented us some outstanding issues on especially 'disruptive innovation'. Tesla appeared to be the best performer for 5 year and 10 year periods, although it is not same for profitability because of research and development expenses. Their average research and development spending has been more than %40 of the yearly revenue being the second after Twitter (%69). We can comment that, the companies launching the products and services being the first, outshine with their revenue increase since it must be investigated in detail by relating this to other factors like company age, size and the period of profitability. This must also be noted as a further research area.

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