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AGILE TRANSFORMATION IN A SOFTWARE COMPANY: THE ROLE OF SENSING IN ORGANIZATIONAL AGILITY

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Agile Transformation In A Software Company: The Role Of Sensing In Organizational Agility

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ABSTRACT

The change in the world has been continuous throughout history. Human beings, on the other hand, have strived to increase their survival and development by constantly adapting to this change. In the last 20 years, a cycle of change has been experienced more rapidly and increasing its impact, unlike the past. These recent changes are defined by the term VUCA and include volatility, uncertainty, complexity and ambiguity. Organizations try to sense changes in their environment and try to adapt to it, and even its survival is only possible in this way.

The aim of this study is to understand the agile transformation of organizations in the world of VUCA and especially the sense competence that helps them understand and foresee the environment and changes. As a result of this focus, this study was conducted to explain how corporate foresight activities affect corporate foresight maturity and agility in an organization that is undergoing agile transformation. Although there have been many studies on agility and corporate foresight, none of these studies focused on the relationship between these areas in a software company that has undergone agile transformation.

In this study, which was carried out to fill this gap in the literature, a technology-oriented corporate foresight activity was carried out within the organization. Survey studies have been conducted to observe the corporate foresight maturity and organizational agility effect of this activity. As a result of the survey studies, different results were obtained from the beginning of the study, so interviews were conducted within qualitative study. When the results obtained as a result of the second study are examined, it is determined how motivations and obstacles that play a role in organizational changes affect the organization. In addition, it was observed how the performance management system and the existing structures in the change process affect the agile transformation works.

Keywords: Organizational agility, corporate foresight, organizational change motivation, organizational change, diffusion of agile management practices

ÖZET

Dünyadaki değişim tarihin her döneminde sürekli olmuştur. İnsanoğlu ise sürekli bu değişime adapte olarak yaşamını sürdürme ve gelişimini artırmak için çabalamıştır. Son 20 yıllık döneme bakıldığında ise geçmişten farklı olarak çok daha hızlı ve etkisi artan bir değişim döngüsü yaşanmaktadır. Son dönemde yaşanan bu değişimler VUCA olarak adlandırılmakta ve içeriğinde değişkenlik(volatility), belirsizlik(uncertainty), karmaşıklık(complexity) ve muğlaklık(ambiguity) içermektedir. Organizasyonlarda çevrelerinde yaşanan bu değişimi anlamak ve ona adapte olarak çabalamakta ve hatta varlığını sürdürebilmesi ancak bu şekilde mümkün olabilmektedir.

Bu çalışmanın amacı, VUCA dünyasında yaşayan organizasyonların çoğunlukla içlerinde gerçekleştirdikleri çevik dönüşümü anlamak ve özellikle çevreyi anlamalarını sağlayan sense yetkinliğine odaklanmaktadır. Bu odağın sonucu olarak çevik dönüşüm yaşayan bir organizasyonda kurumsal öngörü(corporate foresight) aktivitelerinin kurumsal öngörü olgunluğunu ve organizasyonel çevikliğini nasıl etkilediğini açıklamak üzere bu çalışma yapılmıştır. Organizasyonel çeviklik ve kurumsal öngörü ile ilgili olarak birçok çalışma yapılmış olmasına ragmen, bu çalışmalardan hiçbiri çevik dönüşüm yaşamış bir yazılım şirketinde bu alanların birbiri ile ilişkisi üzerine yönelmemiştir.

Yazındaki bu boşluğu doldurmak üzere gerçekleştirilen bu çalışmada, teknoloji odaklı bir kurumsal öngörü aktivitesi organizasyon içerisinde gerçekleştirilmiştir. Bu aktivitenin kurumsal öngörü olgunluğuna ve organizasyonel çevikliğe etkisini gözlemleyebilmek için anket çalışması yapılmıştır. Yapılan çalışmanın sonucunda beklentilerden farklı sonuçlar elde edildiği için nitel bir araştırma çalışması içerisinde mülakatlar yapılmıştır. Gerçekleştirilem ikinci çalışma sonucu elde edilen sonuçlar irdelendiğinde organizasyonel değişimlerde rol alan motivasyon ve engellerin bu çalışma kapsamında organizasyonu nasıl etkilediği belirlenmiştir. Ek olarak performans yönetim sisteminin ve değişim yönetiminde varolan yapıların bu çevik değişimi nasıl etkilediği gözlemlenmiştir.

Anahtar Kelimeler: Örgütsel çeviklik, kurumsal öngörü, örgütsel değişim motivasyonu, örgütsel değişim, çevik yönetim uygulamalarının yayılımı.

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INTRODUCTION

It is a period where changes are very intense and rapid in many areas in the world. Especially since the 1980s, the pace of change has increased and today this rate of increase has reached very high levels.US Army Academy first started using the term VUCA in 1991. This term used for situations in a war environment is nowadays valid for almost all organizations (Worley & Jules, 2020). The underlying purpose is to use it to indicate possible future changes. VUCA can be extended as volatility, uncertainty, complexity and ambiguity. The main purpose of the term is to describe change and turbulence for any organizational structure. The concept of change and turbulence actually refers to uncontrollable events that take place outside the organization and have high impacts on the organization (Baran & Woznyj, 2020).

The first term volatility can be defined as the speed of changes in environmental elements in a specified area. The trend of volatility requires rapid adaptation with the absence of prior informed and prepared forecasting mechanisms. The second term complexity refers to the number and variety of factors involved in the decision mechanism and the relationship with each other is the factor that increases the complexity. In environments with high complexity, decision-making processes are directly affected and affect rational decision-making based on data. As the complexity increases, it becomes difficult to understand the environment and make decisions based on the understood environment. The third term uncertainty can be defined as being unable to predict the future. Uncertainty can blur decision-making abilities, creating difficulties in keeping things running. One of the main reasons for the uncertainty is the weakness of the people in the organization in perceiving such a complex environment in terms of capacity. Change in the level of uncertainty of the environmental situation is a factor that reduces predictability. The last term ambiguity is the lack of clarity when interpreting a topic for various reasons. Many internal and external data will be used for evaluation, and the quality and accuracy of these data are factors that increase the uncertainty. Parallel to the increase in ambiguity, the situation of making interpretation becomes more difficult (Ghosh, 2020).

Although the VUCA world originated within the military organization, all types of organizations are facing highly volatile changes. Deregulation and globalization, which increased as a result of the dissolution of the Soviet Union, provides a disruptive change in all areas. Especially the

increasing competition with globalization and the entry of different local and global players into the market, complications occured inside it. The biggest changes at the policy level are the oil crises and wars that arise in the Middle East, triggering great changes rest of the world(Oberhauser & Lipietz, 1994). In recent years, the chaotic situations that emerged as a result of the departure of the UK from the European Union through the Brexit process and Donald Trump's trade war with China can be added to these. All these political changes trigger smaller-scale changes and affect many different areas around the world, from individuals to organizations.

Changes in technology likewise increase the VUCA effect. While automation in production is a big step, competitive advantage is now provided with supply chains operated at global level. However, the political and economic changes affecting the global level, directly affect these supply chains, causing large-scale problems in production and distribution.

Another important effect of technology is that it causes fundamental changes in traditional business models. This situation sometimes causes long-established organizations to disappear or lose their influence. Online platforms in retail sales cause traditional sales organizations to shrink or even disappear due to the development in technology. Similarly, with the widespread use of technology, sharing economy companies can gain power in the market with completely different business models and different solutions. In fact, structures that dominate a certain technology may face withdrawal from the market as they cannot respond to the different innovations of their competitors. Technology has accelerated faster than ever before in the last decade, and its impact is not limited to technology, but has become a direct influence on business models. While disruptive technologies put new business models into use, they force existing business models to change or even disappear (D. Teece, 2018).

While all these effects are already sufficient to indicate the VUCA environment, the COVID-19 epidemic, which affected the whole world in 2020, unexpectedly impacted all life. Production has been disrupted and even halted due to the disconnected supply chains with its global impact. In an environment brought about by the inability to leave the house, companies quickly established remote-working practices and tried to run businesses in this way. Many physical venues have been temporarily closed, and there have been those who completely ceased their activities due to the deteriorating business environment. The inability of schools to physically maintain education caused the disruption of education and increased the existing inequality. All these effects have

increased the use of remote or digital service models in sectors such as physical education, shopping, food and beverage, and have led to the creation of new practices.

In particular, the fact that the software industry is global and the technology is at the core of the business, increases the possibility of companies in this sector to encounter uncertainties compared to other sectors. For this reason, companies change their existing structures to be agile and try to ensure that the whole organization works in harmony with this new structure with agile practices and methods. The main purpose is, to correctly and timely sense the change in the world ofVUCA and to adapt to these changes.

With all these uncertainties, the COVID-19 outbreak has brought the level of uncertainty to the extreme. The challenges faced by individuals and organizations have a unique feature in this regard. Software companies had started to combat uncertainty by applying agile practices and methods within themselves to combat uncertainty before the epidemic. With the COVID-19 outbreak, the weight of agile structures has increased more and they are trying to manage the situation with agile methods. It is a very important organizational competency to be able to detect changes in the environment with sense competencies, and to respond quickly to change by using them within the organization.

Agile transformation activities triggered by all these changes experienced at the individual and organizational level are spreading rapidly. Organizations undergoing an agile transformation process try to manage this change in accordance with their organizational structures and cultures (Janssen & van der Voort, 2020). Depending on the management of the agile transformation process, it can be seen that agile practices and methods are settled at different maturity levels in organizations. When all these transformation activities are examined, it is observed that generally the focus is on adaptation to change.

In the process of determining the research topic for this thesis, agile transformation in organizations was taken as a basis. However, when the general literature and practices are examined, it was observed that the sense part, which is another important leg of organizational agility, is not focused enough on agile transformation activities in general. For this reason, the main purpose in the thesis is to do research for sense competence in the agile transformation process and for this purpose, to carry out the research during the transformation process in a software company.

The research in this thesis has been undertaken in two phases, which will be reported as two studies. Study 1 was undertaken to answer the main research question of the thesis through quantitave methods, consisting of survey studies measuring foresight activity and its effect on organizational agility. However, the results were not as expected and somewhat contradictory with other variables. Hence, it prompted Study 2 which includes a qualitative study that will reveal the reason behind the results of the first study. A literature study has been conducted for each study and its results are discussed in the relevant sections.

The research topic focuses on organizational agility which its roots depend on both the dynamic capabilities and absorptive capacity. The organizational agility framework details are included into the literature review part which is especially focuses on sense and response framework. Besides, the sense part of the organizational agility is the focus research area by using the corporate foresight methodologies, practices and maturity model. Organizational agility response part also represented and supported by the software production line implementation research and practices.

Literature review in Study 1 part motivated by two main questions: (1) what are the main theoretical constructs have been built in the past research which support sense dimension of the organizational agility; (2) How management theories are connected to each other to show the relationship between the organizational agility, other theories and practices.

Literature review in Study 2 part motivated by two main questions: (1) what are the main theoretical constructs have been built in the past research which explain the decrease in survey factors; (2) How management theories are explained the first study results by using interview results.

This dissertation aims to research in the specified areas in the focus of organizational agility. In the last decades organizational agility was used and implemented by various type of organizations with increased interest on this topic. In the global context most of the software companies are implementing agile practices to overcome both external and internal pressures to change. Agile implementations in software companies mostly covered in the response capability. Sense capability of organizational agility work on these organizations, is not focused well comparing to the response capability. Thus, organizational agility is crucial for software companies to foresee possible futures and adaptive to the rapid change in the environment and consumer requirement changes. Implementing foresight activities, measuring and evaluating the effects of foresight

activities by surveys and interviews provide important explanations for questions to researchers and practitioners. This dissertation is dedicated to answering some of the questions by using strategic management theories and practices.

The main aim of first part of Study 1 is to present the theoretical base of the research which is also exhibited in this dissertation. This part includes a detailed literature review by using main management theories. As main theoretical areas, resource based view, dynamic capabilities, absorptive capacity and ceremonial adoption are detailed inside the thesis. In addition to that theories, literature review part includes practical representation of theoretical bases like agile software development and corporate/strategic foresight. In the last part of the literature review, research propositions are developed by analyzing the existing researches and identified gaps. In Study 2 literature part, institutional theory, ceremonial adoption, organizational change, agile motivations and blockages are detailed. The structure of the thesis can be viewed in the appendix.

STUDY 1: MEASURING THE EFFECT OF CORPORATE FORESIGHT ACTIVITY ON ORGANIZATIONAL AGILITY MATURITY

When organizational agility literature was searched, it was seen that different frameworks tried to explain this concept. Although the framework models seem different, in general organizational agility term covers activities and practices within and outside the organization (Baškarada & Koronios, 2018; Overby, Bharadwaj, & Sambamurthy, 2005). While trying to respond quickly to changes within the organization to the possible changes, on the other hand possible changes are tried to be determined as early as possible with sense activities related to external environment (Overby et al., 2005).

In organizational agility, especially in the software field, organizational agility implementations mainly depend on the agile manifesto (Houston, 2014). Agile manifesto generally covers organizational changes and consist of norms and practices built on team concept. These changes that are tried to be implemented in companies generally include activities that will include rapid response to change. Sense dimension, which includes interaction with the outside world, is less focused (Wendler, 2013). With this point of view, a study was conducted on the sense dimension,

which is thought to be less focused by companies. When the literature on sense dimension was examined, it was seen that corporate foresight activities could be used to identify risks and opportunities in the environment as sensors of the organization. In this framework, a detailed study has been done on the studies of Rohrbeck(Rohrbeck & Kum, 2018). The three dimensions as preceiving, prospecting, probing are used to build the maturity model. Perceiving part includes practices that will determine the factors which are triggered by environmental changes (Rohrbeck & Kum, 2018). These practices can be in areas such as politics, economy, technology.

In the thesis, by organizing a technology-oriented foresight activity, the effect of this activity on the foresight maturity was tried to be measured. At the beginning of the study, our expectation is to increase maturity with this foresight activity (Rohrbeck & Kum, 2018).

This stage of the study will be specified as Study 1: Measuring the effect of corporate foresight activity on organizational agility maturity, and the next section will contain details of the theoretical framework, method and empirical results for Study 1.

CHAPTER I: THEORETICAL FRAMEWORK

1.1.Resource Based View

Resource based view is a strategic management theory that connects organizational resources to firms' strength or weakness. All tangible and intangible assets are categorized as firms' resources like machinery, employees, patents, building, contracts etc. Reconfiguration of these resources can be provided by the management to get get sustained competitive advantage. These resources can be a barrier to entry for competitors. Machine capacity, customer loyalty, experience on technology are all resource advantages which brings companies competitive advantage (Wernerfelt, 1984)

Dynamic capabilities is one of the most supportive strategic management theory which is connected to organizational agility. Dynamic capabilities theory is based on the resource based view of the firm. Resource based view in strategic management explains sustainable competitive advantage with the firm-specific resources (Lockett, Thompson, & Morgenstern, 2009). All assets in the form of tangible and intangible like machinery, buildings, patents, employees, information, knowledge are the resources of a firm (Barney, 1991; Wernerfelt, 1984).

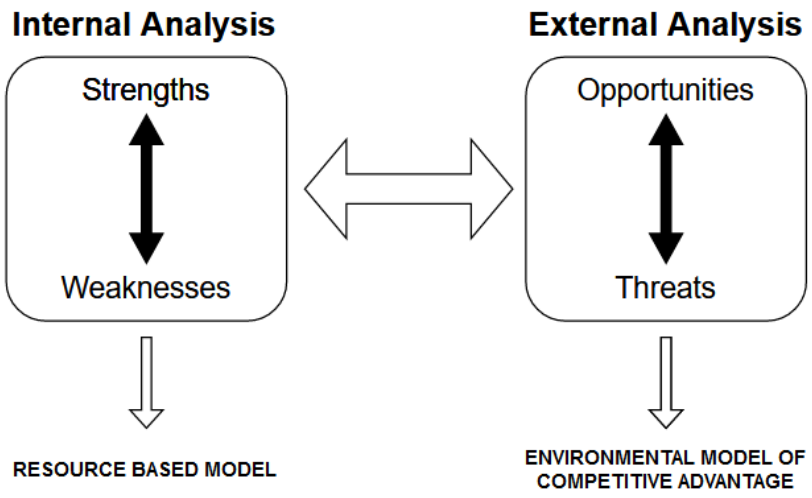
Competitive advantage and sustained competitive advantage have similar meanings, but there is a strict difference between them. When a firm generates a strategy and this strategy is not applied by any other firm in the competitive landscape then this firm have competitive advantage. Duplicating the benefits of the strategy makes the difference. A firm gains sustained competitive advantage when it has competitive advantage and any other competitors are unable to dublicate its strategy (Barney, 1991).

When a firm achieve sustained competitive advantage in a sector and other competing companies couldn't control resources then the resource distribution inside the market is heterogeneous. The resource heterogeneity inside the environment generate barriers to entry for the competing firms. When resources used by the sustained competitive advantaged firms are homogeneous then the other firms can implement the relevant strategy to reach the similar performance. Firms implementing strategies to build and protect barriers to entry, to move away other firms from its

resources. As a result, competing firms which have different levels of control over strategic resources are compete in a barriers to entry market (Barney, 1991).

The resource based view theory focuses on the internalities and externalities of a firm. Internalities include strength and weaknesses of the resources. On the other hand, externalities include opportunities and threats. Strategies generated from the internal and external analysis of the firm. Sustained competitive advantage in a firm would increase through the efficient use of firm's resources. Figure 1 describes the resource based view and its relation to environmental model (Barney, 1991).

Figure 1: Resource based model and environmental model adopted from (Barney, 1991)



To gain sustained competitive advantage, firm resources should be evaluated in four aspects. The resources should be valuable that generates opportunities in the environment. The value of the resource can also decrease or neutralize the effect of the threats. The second aspect of the resource is being rare. Rareness can turn into resources when they generate opportunity or remove risks from the environment. Resources used in a strategy should increase efficiency and effectiveness to be valuable. If the resource is rare at the present time and in the future, it gives firms an advantage over competition over resources. A rare resource can be provided by few firms in the

environment. Valuable resources can be provided by other competitors, but to survive the competitive advantage then the valuable resources should be used only by small number of firms in the same environment. If a valuable resource can be reached and used by the all firms then a valuable strategy cannot be provided. The valuable and rare resources are not enough for sustained competitive advantage. Resources, which are hard to imitate, are support to survive competitive advantage. Inimitable resources cannot be duplicated by other firms. "Unique historical conditions, casual ambiguity and social complexity make the resources inimitable" description made by Wernerfelt for inimitable resources. Valuable, rare and inimitable resources are necessities of competitive advantage in a firm. To gain sustained competitive advantage organizations have to build management systems to capture these resources inside the firm. In total of four aspects of the resources generate sustained competitive advantage, which is modeled as VRIO framework (Barney, 1991). Resource position of a firm can build barriers to entry in a related field. These barriers can be first mover advantages, attractive resources like capacity, production experience, technological leads and mergers-acquisitions. Firms which use their resources to make barriers, then they can be advantageous with respect to competition(Wernerfelt, 1984). In Figure 2, VRIO framework detailed in a matrix (Barney, 2002).

Figure 2: VRIO Framework adopted from (Barney, 2002).

VALUABLE	RARE	COSTLY TO IMITATE	EXPLOITED BY ORGANIZATION	COMPETITIVE IMPLICATIONS
No	-	-	No	Competitive Disadvantage
Yes	No	-		Competitive Parity
Yes	Yes	No		Temporary Competitive Advantage
Yes	Yes	Yes	Yes	Sustained Competitive Advantage

The sustained competitive advantage, capabilities which are mentioned above as valuable, rare, inimitable and non-substitutable are the main pillars of a firm's strategic position on positive side

which bring huge advantage to the firms in stable environments and markets. However, in volatile environments these capabilities of a firm limits the flexibility and adaptability of the organization.

Resource based view explains the sustained competitive advantage in relatively stable markets and sectors. Most of the companies track resource based strategies to get advantage over its competitors. These companies use to guard their resources with the help of regulations, intellectual property rights and other type of resource protection methods. In highly dynamic sectors like technology, it is not possible to stay competitive only protecting the resources. Highly fluctuating and variable demands in dynamic sectors, firms need to be responsive to the change in environment. Innovation is also a part of the strategy to offer innovative products to the market by reconfiguring and redeploying the external and internal capabilities (Teece, Pisano, & Shuen, 1997).

1.2.Dynamic Capabilities

Resource based view, is based on reources of a firm. Resource based view explains how firms can achieve competitive advantage and provide it in a sustainable way. In this view, firms which provide valuable, rare, inimitable and nonsubstitutable resources, then they can provide sustained competitive advantage. In stable environments or market, resource based view can be achieved successfully. In volatile environments dynamic capabilities extended resource based view. Resource based view is not sufficient enough to explain the ways achiving sustained competitive advantage in dynamic environments (Barney, 1991; Eisenhardt & Martin, 2000; Teece & Pisano, 1994)

Dynamic capabilities as a strategic management theory, seeks ways to firms how to implement sustained competitive advantage in a rapidly changing environments. Technological shifts and environmental changes in major areas both in economical and non-economical, pushes firms or organizations to align their capabilities and resources to these changes. In stable markets and sectors, resource based view can be an appropriate strategy to gain sustained competitive advantage over other firms in the same environment. Resource based view strategies are not suitable to gain sustained competitive advantage in volatile markets or high diversified sectors like

technology. In highly volatile conditions, firms need to understand the change in the environment and respond them quickly. Companies, who have flexible organizations and productions with the support of human resource capacity, are reorganize and reconfigure the internal and external competencies to gain competitive advantage (Teece & Pisano, 1994). This kind of competitive advantage is different than resource based view and is called as dynamic capabilities. Dynamic refers to the volatile character of the environment and capabilities refers to the responsive competencies of the firm which include the reconfiguration, reorganization and responsiveness of the organization resources (Teece & Pisano, 1994). Table 1 shows definition of dynamic capabilities from different authors (Akwei, 2007).

Table 1 : Definitions of Dynamic Capabilities from different authors adopted from (Akwei, 2007)

Reference	Definitions
(David Teece & Pisano, 2003)	"The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments"
(Zollo & Winter, 2002)	"A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness"
(Zahra, Sapienza, & Davidsson, 2006)	"The abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision maker(s)"
(Helfat et al., 2007)	"The capacity of an organization to purposefully create, extend, or modify its resource base."
(Teece, 2007)	"Dynamic capabilities can be disaggregated into the capacity (a) to sense and shape opportunities and threats, (b) to seize opportunities, and (c) to maintain competitiveness through enhancing,combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets."
(D. Teece, 2018)	"Dynamic capabilities, which are underpinned by organizational routines and managerial skills, are the firm's ability to integrate, build, and reconfigure internal competences to address, or in some cases to bring about, changes in the business environment."

Dynamic capabilities can be treated in two different environment structures. The first one is high volatile environments and the second one is stable environments (Eisenhardt & Martin, 2000). In general, high volatile environment depends on disruptive technological developments. The new technological improvements make redundant of current capabilities inside the firm, which is implemented by past experience. The new environment blurred the future of business in established firms. For that reason, established firms forced to implement new capabilities and competencies by using new technology as radical innovation. On the other hand, firms which are in stable markets or environments can predict the future. Unlike radical innovation, incremental innovation can be used to change its capabilities and competencies by the change occurred outside the firm. Dynamic capabilities strategy can be changed in these two different environments (Augier & Teece, 2009; Eisenhardt & Martin, 2000)

Firms use defined processes and procedures to improve its resources and capabilities by the effect of the technology changes incrementally in a stable market. Experimentation is the main activity in a volatile environment by processing real time information, which is used to sense environment. Routines and processes couldn't work well enough like in a stable market. Organizations need to implement non-routine research to understand the uncertain and unpredictable future. Experimentation needs simple hierarchy and flexible decision making rules. Organizations are set routines for resource reconfiguration and allocation especially in knowledge based workers. For that reason flat hierarchies and non-linear strategic choices are the main pillars of a firm in a volatile environment (Eisenhardt & Martin, 2000).

Firms can also gain capability as building new thinking skills inside the organization to provide different aspects. They also use alliances and acquisitions for integrating external information and knowledge to the organization itself.

Dynamic capabilities evaluate through learning mechanisms. One of the learning mechanism is the repeated practice. The rules and processes are effect the organization to complete its business. Repeated practice helps people to understand the processes besides it, ensures the routines run effectively. Organizations, which are open to mistakes, are adding a new type of learning in the firm. Small failures give employees motivation for learning to think about the processes and improve the total experience of the firm (Eisenhardt & Martin, 2000).

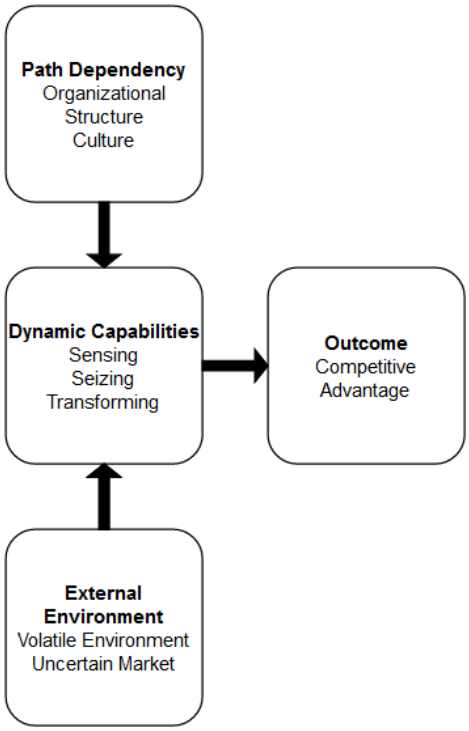
Dynamic capabilities can be classified into three main dimensions as sensing, seizing and transforming. Searching, analyzing and determining opportunities and threats in the environment which are related to demand needs of the firm is called as sensing (Teece, Peteraf, & Leih, 2016). As the markets and technological developments are into flux, companies need to sense environment to expand its product portfolio, customer base or explore totally new markets (D. J. Teece, 2019). Sensing is a kind of managerial capability about managers' observation, understanding about the environment and the future or a structured process inside the firm to develop insights and view.

Sensing is the first step of implementation of a strategy. After successful sensing activity, the next step would be seizing. Reorganization and restructuring firm assets are helped to execute the choices within the company, which are selected in the seizing phase. Seizing needs flexible capital flow, satisfied and motivated employees and supportive corporate culture. Networking opportunities between different parties like startups, suppliers and customers are also need for a better performance (Teece et al., 2016).

The third step of the dynamic capabilities is the transforming or shifting. Aligning the organization overtime a new opportunity or threat appears is crucial to be dynamic. Sensing, seizing and transforming within the organization could be continued or semi-continued to be sustainable about the changes in its environment like technology, competitor and customer (Teece, 2007).

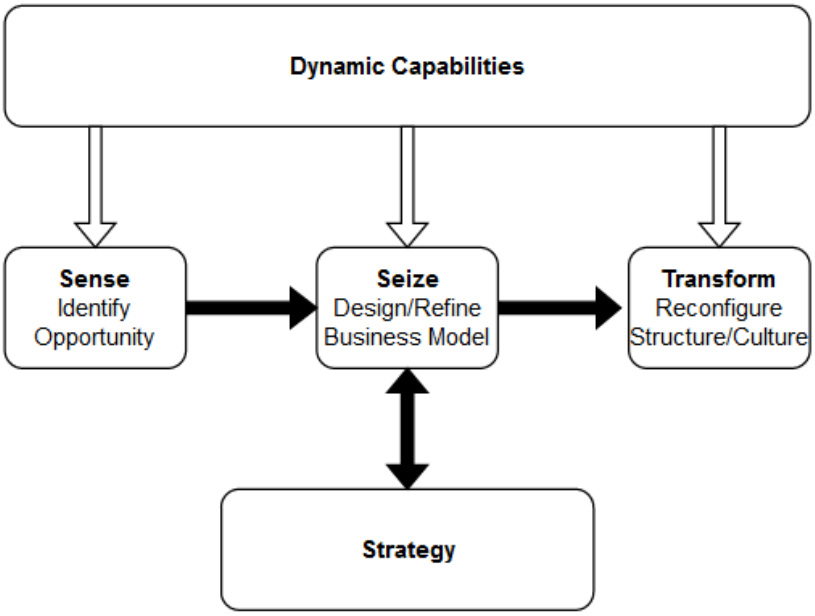
The three fundamentals of dynamic capabilities provide abilities to overcome incremental change in the environment. In every sector, especially in the last decades, changes occur rapidly with the technological advancements. Most of regulated sectors are also face the risks of ambiguity and uncertainty in their future business areas. Firms are working to implement and provide dynamic capabilities with different methods inside the organizations by trying various methods and practices. In highly volatile environment, detailed, documented and well-designed methods and routines are not preferable, processes which are basic, empirical and easily changeable are used mostly (Ringov, 2017). Organizations should implement and improve agile capabilities to build sustained competitive advantage (Zainal, Yousuf, & Salloum, 2020). Figure 3 shows dynamic capabilities framework with its relation to path dependency and external environment (Teece et al., 1997).

Figure 3: The Dynamic Capabilities Framework adopted from (Teece et al., 1997).



Dynamic capabilities has a direct relation to the business model design, which is a part of the organization's strategy. Both strategy and business model determine how organization compete in an environment. Strategy includes business model, segmentation of the market and how to operate in the specified business model. Figure 4 shows dynamic capabilities and strategy combination to determine and implement feasible business model (D. Teece, 2018).

Figure 4: Simplified schema of dynamic capabilities adopted from (D. Teece, 2018).



1.2.1. Microfoundations of Dynamic Capabilities

The definition of dynamic capabilities stated as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environment" (Teece et al., 1997). To extend this definition, firm's abilities in volatile environment could be as sensing, seizing and transformation capabilities. These capabilities reinforced by distinct skills, processes and organizational structures which are classified as microfoundations of dynamic capabilities (Teece, 2007). Microfoundations are used to explain of establishing a routine or capability inside the organization and overall lifecycle of routine or capabilities can be affected. Distinct skills, processes, procedures, organizational structure, decision rules and disciplines are the basis of dynamic capabilities like sensing, seizing and transformation. These capabilities are hard to build and operate inside organizations (Teece, 2007).

1.2.1.1.Distinct Skills

The main aim of the dynamic capabilities is to provide sustained competitive advantage for a firm or organization in a rapidly changing environment. Sensing environment and discovering opportunities are important activities which are done by the employees inside the firms. These employees need specific skillset to discover opportunities by using their cognitive and creative capacities. These employees also use the collected information in different forms to generate specific knowledge and improve their creative capacities.

Not only distinct skills are crucial for employees but also managers have to use distinct skills inside the organization. Managers use leadership skills inside the organization. Traditional managerial skills are not enough to orchestrate the possessed assets, renewal of the organization and rebuild routines, processes. The orchestration is the key activity for managers to implement dynamic capabilities inside the firm. Teams inside the organizations need to be autonomous and work in a low hierarchy. For that reason, they can easily make decisions without boundaries and efficiently in volatile environment. The autonomy doesn't mean that they can make decision out of firm strategy, they need to be coordinated and connected within the organization (Teece, 2007).

1.2.1.2.Processes, routines and procedures

Dynamic environment forces push firms to make changes inside the organization to respond to the external changes. Change is a complex issue in an ongoing organization in established operations. Different phases of the change, need variety of processes like search for external opportunities and threats, decision-making to find the appropriate action for the firm, change management to design, plan and implement the decided action. Firms are implementing appropriate processes both in organizational and managerial level to effectively benefit from the dynamic capabilities. Dynamic capabilities can be understandable from the processes implemented inside the organization and the implemented strategy effectiveness can be measured from the processes (Helfat et al., 2007).

All processes within a firm need managerial support to successfully implement and utilize activities. Rules, operating procedures are formal and experience, norms, values are informal ways

of orchestration. The main problem is how to implement these processes and the answer is the management team. Managers are the key factor to coordinate and assimilate activities inside organizations.

Meanwhile connected with each other through hierarchy, these traditional and mostly established organizations built with employees, teams and departments. Formal processes are used to connect all type of organizational units inside the firms. These processes grant the cooperation and coordination opportunities between different type of organizational units. Other than hierarchy, these processes help to focus and shape interests. Employee level actions can be triggered or disabled by the use of formal and informal coordination mechanisms (Felin, Foss, Heimeriks, & Madsen, 2012).

Organizational connectivity between different actors and processes with the help of technology improve learning curves. The main problem inside the firm is how to build a knowledge connection between individual and organization. The result of successful knowledge connection is business value. Organizational knowledge is crucial for competitive advantage and shared knowledge is needed to use in demanded areas (Teece et al., 1997).

Dynamic capabilities has three dimensions sense, seize and transformation. Similar to the dynamic capabilities, organizational level knowledge has similar categorization as knowledge creation, sharing acquired knowledge and value creation (Chen & Huang, 2007).

Knowledge creation which connects both external and internal environment to find and get necessary information. The next dimension is to share acquired knowledge into different functions and teams. The last dimension is the use of knowledge which is the value creation phase of knowledge. Applying one or two of knowledge dimensions is not enough for gaining competitive advantage. All phases of organizational knowledge should be implemented to gain competitive advantage (Chen & Huang, 2007).

1.2.1.3.Organizational Structures, Decision Rules and Disciplines

Organizational structures determined by three different factors. Formalization means organizational level policies, practices, standardized rules. The level of formalization can be differ from organization to organization. Organizations which use high number of policies, practices and rules which shape employee and team behavior can be described as high level formalized organization. Practices are formed by norms inside teams and other informal activities. High level formalized organizations can be crucial for increased innovation activities within the firm boundaries. The low level formalization decrease utilization or free atmosphere which directly affects the work on the business tasks which is preferable by organizations in dynamic environments (Chen & Huang, 2007).

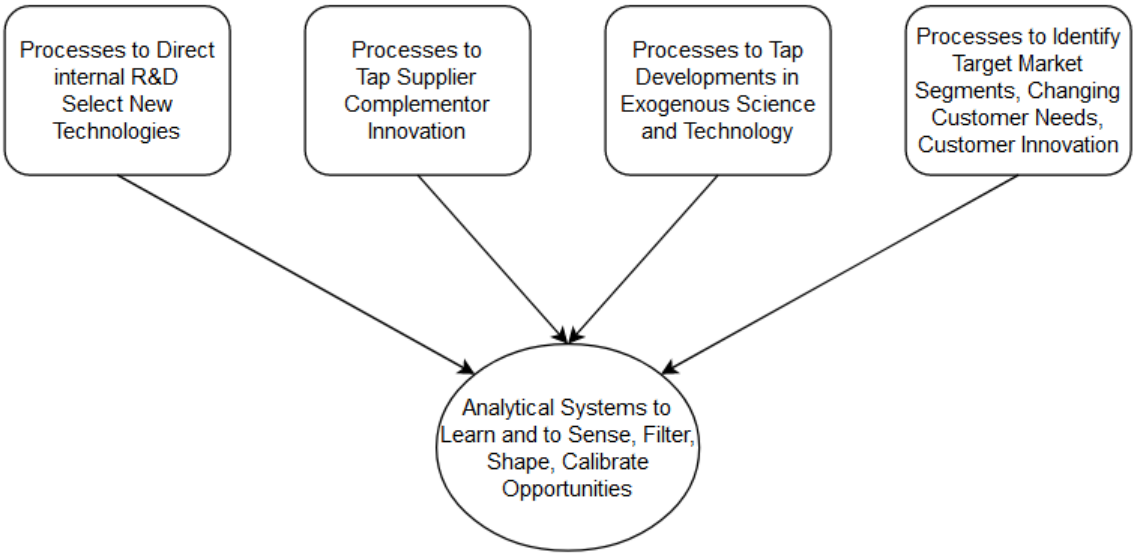
Centralization is another factor in organizational structures. Organizations built over hierarchies from a top-down approach which determine the power, information flow and decision-making distribution. Highly centralized organizations consolidate power and decision-making mechanism to the upper levels of management. In this type of organizations, teams and individuals do not participate into the decisions, non-communicative and chain-command atmosphere is created inside the organization. Decentralized organization share the power and spread the decision making to the low levels of the organization. In this type of organizations, employees and teams have the opportunity to make decisions about their work and this increases the acceptance of the firm strategy. Decentralization and autonomy of make employees feel the responsibility of their own decisions and motivate them to solve obstacles about the job itself (Chen & Huang, 2007).

Interdependency or integration is the latest organizational factor which affects the structure. Level of communication and interaction between different departments, teams and employees affects the integration maturity of the organization. Employees and teams which are worked in silos or isolated areas, can work on their own responsibility and cannot involve or interact with other employees. Less formal and less centralized organizations can provide an integrated work environment by supporting social interaction, cross functional work, idea and knowledge exchange. Integration opens new opportunities by enabling the collaborative work (Chen & Huang, 2007).

1.2.1.4.Sensing Capability

Organizations need to connect to the external environment in order to identify technological changes, consumer choice, competitive landscape changes and explore opportunities in the market. Sensing is a kind of activity which needs to be done properly and would be in a defined procedure. Individuals and teams use sensing activities in their daily routines to integrate newly identified information and knowledge to their duties and jobs. Organizational level processes use to leverage sensing activities for properly use inside the organization. Organization's external nodes like sales-marketing or customer interaction points can be used as probe to connect external environment. Sales and marketing functions are suitable for gathering customer requirement changes and with a suitable processes these information can be used into the organization's other departments and teams (Teece, 2007). In Figure 5, elements of ecosystem sensing capability is shown (Teece, 2007).

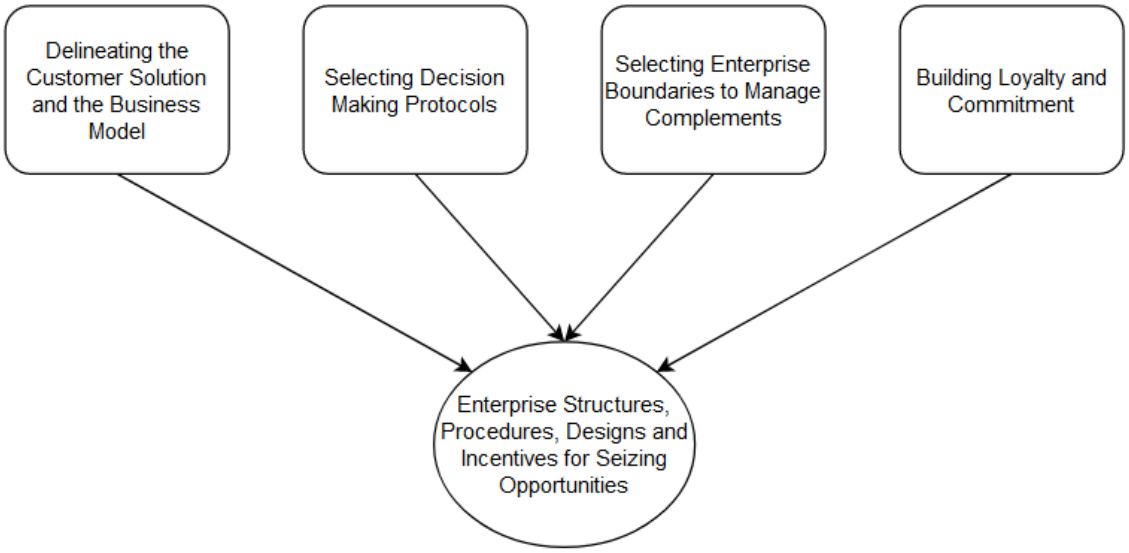
Figure 5: Elements of Ecosystem Sensing Capability adopted from (Teece, 2007).



1.2.1.5.Seizing Capability

In organizations, sensed information should be processed into knowledge or other usable forms of information. For that reason, organizations need to capture sensed opportunities as new products, processes or services. Organizations use these opportunities to improve business models, its organizational development, and as an input for decision making as seizing capability (Teece, 2007). In less formal and less centralize organizations not only management but also individuals and teams are the main participants of these seizing phase activities. In Figure 6, strategic decision skills and execution is shown (Teece, 2007).

Figure 6: Strategic Decision Skills and Execution adopted from (Teece, 2007)



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1.2.1.6.Reconfiguring Capability

Sensing capability is, to build bridge between the external environment and organization itself by getting informed about the technological changes, consumer behavior shifts and other major changes which effects competitive landscape. In seizing capability, firms process the external information to be used inside the organization. The last capability is reconfiguring or transformation. Organizational assets and resources are reconfigured as a result of sensed and seized knowledge. This capability is generally implemented by management team and self-managed teams (Ande & Dahlan, 2018). Organizations renew and redesign existing processes and practices to maintain competitive advantage. Resource alignment, realignment, coalignment and redeployment are the crucial activities done by the organization (Teece, 2007). In Figure 7, combination, reconfiguration and asset protection skills and in Figure 8, the whole dynamic capabilities and microfoundations relationships are shown (Teece, 2007).

Figure 7: Combination, Reconfiguration and Asset Protection Skills adopted from (Teece, 2007).

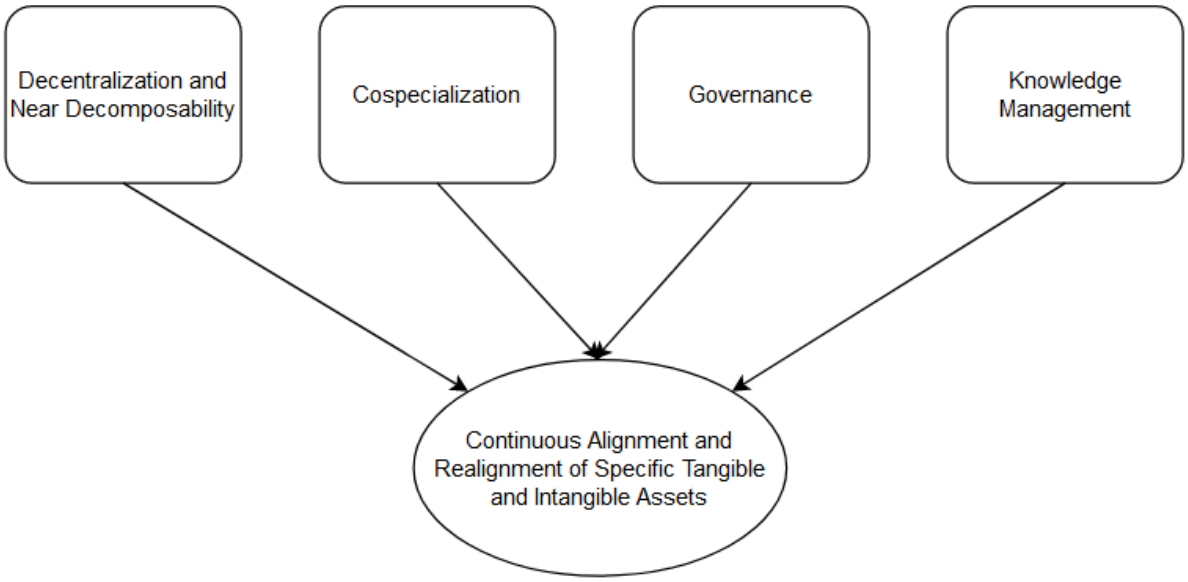
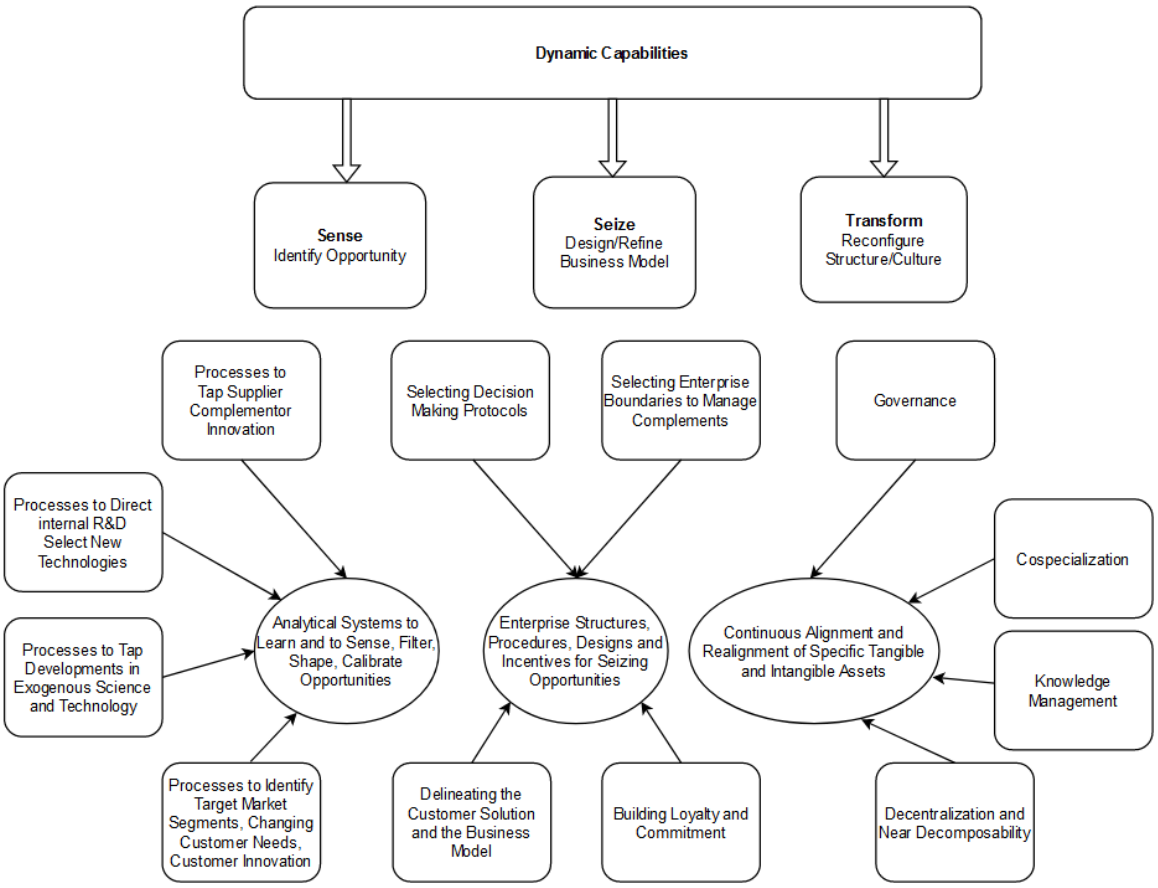


Figure 8: Foundations of Dynamic Capabilities and Microfoundations adopted from (Teece, 2007).



1.3.Agility and Flexibility

Flexibility and agility terms are used in similar meanings in practice, but in reality they refer to different concepts. They both emerged in manufacturing sectors for efficiency reasons. The mass production methods which are implemented since 1900s are changed in time by major economic, political and technological changes. Introduction of mass production in 1920s is so successful that most of the big manufacturers generate competitive advantage by implementing these production methods. Automation technologies, variation of consumer choice, the rise of oil prices, globalization and introduction of new actors to the competition, pushes new production methods.

After 1960s and 1970s, flexible production methods are introduced. In 1970s, flexible production methods evolved and used by many firms and these methods matured through the decade. Increased globalization and technology, change the competition in markets and businesses all over the world. These changes also have an impact on customer preferences. Customers request different type of products which are customized to them. Consumers are expecting high-quality, low priced, custom products for their needs. In 1970's, increased competition with variable consumer choice and cost, push companies to change their organizational structures and production methods by the help of technology. These changes have provided flexibility in the production line and labour, especially in the field of mass production. In 1980's use of computer technologies make production more flexible and automated. In the flexible assembly lines, producers can produce different type of products by making minor changes on the existing assembly lines (Baker, 1996). Flexibility help firms to answer variation of consumer choices.

On the other hand, agility is not totally a new approach in manufacturing and other sectors, it provides the previous developments on manufacturing and spread the best practices all over the organization by adding proactivity, sensing and responding which are main parts of dynamic capabilities. These capabilities are essential in a turbulent environment to survive by implementing competitive advantage (Koçyiğit & Akkaya, 2020). The main differences between agility and flexibility can be summarized as follows (Wendler, 2013):

- "Agility means speed and fast response"
- "Agility uses knowledge and sharing of knowledge is crucial"
- "Change is not a single attempt which it continues in agile"
- "All agile practices are not only used in manufacturing or production line, they are actively used and implemented all through the organization"

The drivers of agility are, changes in the environment. The main change reason in all sectors is the market push. There are main issues that characterize the agility. Automation and price cost consideration is the first issue that shape the agile definition. After World War 2, consumers looked for low priced products which were determined by the post-war atmosphere. Inequality between supply and demand pushed consumers to buy the lowest priced product (quality is not a demanded preference) which is supported by automation and mass production. Both automation and mass

production systems are implemented to produce fixed products which makes them rigid and non-flexible (Draaijer, 1992; Yusuf, Sarhadi, & Gunasekaran, 1999).

The second issue is the variety of consumer choice and expectation about the products. The overall markets were changed during 1980s and these changes triggered the quality wave in mass producers. The problem is mass production with variety and quality increases prices, so manufacturers implement new methods to meet the customer expectations with low prices. Japanese firms first to implement these quality management processes and after that other firms implement new quality processes like total quality management(TQM), statistical process control(SPC) and quality function deployment(QFD) (Yusuf et al., 1999).

The third issue is the competing priorities with the increase of globalization in 1990s. Decreasing barriers between countries push firms and organizations to be responsive, decreasing product lifecycle, delivering product without barriers and high international competition (Gehani, 1995; Yusuf et al., 1999).

The fourth issue is the integration and proactivity which enables manufacturers to adapt to the new competitive environment. Integration with external environment is a mandatory activity to act proactively by determining consumer behaviors, requirements and technological changes. When manufacturers use proactively determined information in the organizational configuration then the organization to get strategic advantage in a highly competitive market (Yusuf et al., 1999).

The last issue is synergy which enables an organization collectively response to the change. In manufacturing flexibility strategies focused on especially in the production line. Speed or responsiveness improvements are not enough to create a sustainable strategy in highly global competitive market. Organization wide strategies which makes them flexible, responsive and proactive for a highly fluctuating environment. The previous consumer requirement is quality products with low cost. In the last two decades, delivery time is also an important parameter to win competition. All organizational departments from HR to marketing and all assets should include in the initiatives with technology and production. Success depends of the strategy which includes foresight, adapt and respond. Firms who implement these capabilities successfully are the winners of the competition (Yusuf et al., 1999). Table 3 shows agility definitions from different authors (P. Tallon, Queiroz, Coltman, & Sharma, 2019; Yusuf et al., 1999) and Table 2 shows the attributes of an agile organization (Yusuf et al., 1999).

Table 2: Agility Definitions from different authors adopted from (P. Tallon et al., 2019; Yusuf et al., 1999)

Authors	Definition
(Dove, 1992)	"A system that shifts quickly among product model/lines, ideally in real time in order to respond to customer needs."
(Goldman, Nagel, & Preiss, 1995)	"Capability of an organization to operate profitably in a competitive environment comprised of continually changing customer habits."
(Vokurka & Fliedner, 1998)	"Ability to successfully produce and market a broad range of low cost, high qualityproducts with short lead times in varying size, which provide enhanced value to individual customers through customization."
(Yusuf et al., 1999)	"A successful exploration of competitive bases(speed, flexibility, innovation, proactivity, etc.) through the integration of reconfigurable resources and knowledge management to provide customer driven products/services in a fast changing market environment."
(Rigby, Day, Forrester, & Burnett, 2000)	"The ability of an organization to thrive in a constantly changing and unpredictable business environment."
(Sharifi & Zhang, 1999)	"Agility is the ability of enterprise to respond to change to cope with unexpected changes to survive unprecedented threats from the business environment, and to take advantage of changes as opportunities."
(Hooper, Steeple, & Clive, 2001)	"Ability of an enterprise to develop and exploit its inter and intra-organizational capabilities to successfully compete in an uncertain and unpredictable business environment."
(Sharifi & Zhang, 2001)	"Two main factors: Responding to change in due time and exploiting changes and taking advantage of changes as opportunities."
(Dove, 1999)	"An effective integration of response ability and knowledge management in order to rapidly, efficiently and accurately adapt to unexpected changes in both proactive and reactive needs and opportunities."

(Pal & Pantaleo, 2005)	"The capability to respond to new business demands and opportunities effectively and efficiently, rapidly shifting and aligning business assets to beat to competition to market."
(Ashrafi et al., 2005)	"An organization's ability to sense environmental changes and respond effectively and efficiently to that change."
(Sull, 2009)	"The capacity to identify, capture, and exploit opportunities more quickly than rivals do."
(P. P. Tallon & Pinsonneault, 2011)	"Ability to detect and respond to opportunities and threats in the environment with ease, speed and dexterity."
(Bradley, Pratt, Byrd, Outlay, & Wynn, 2012)	"The ability to sense environmental change and respond readily."
(Roberts & Grover, 2012)	"The degree to which a firm is able to sense and respond quickly to customer-based opportunities for innovation and competitive action."
(Chakravarty, Grewal, & Sambamurthy, 2013)	"The ability to sense opportunities for competitive action and marshal the necessary resources to seize those opportunities."
(Park, El Sawy, & Fiss, 2017)	"A combination of sensing agility, decision making agility, and acting agility."
(Ravichandran, 2018)	"Agility is a competence that allows firms to adapt to contingencies posed by the environment."

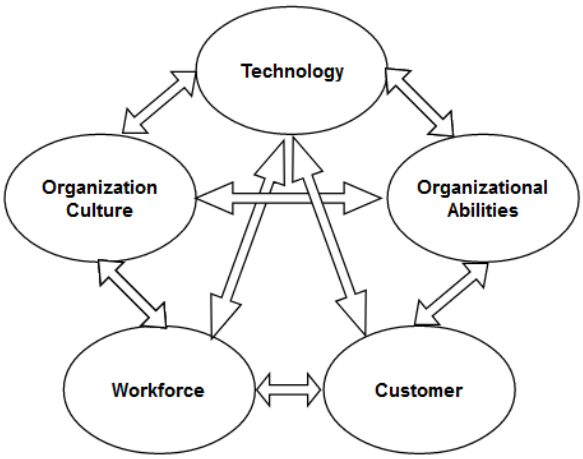
Table 3: The attributes of an agile organization adopted from (Yusuf et al., 1999)

Decision domain	Related attributes
Integration	"Concurrent execution of activities" "Enterprise integration" "Information accessible to employees"
Competence	"Multi-venturing capabilities" "Developed business practice difficult to Copy"
Team building	"Empowered individuals working in teams" "Cross functional teams" "Teams across company borders" "Decentralised decision making"
Technology	"Technology awareness" "Leadership in the use of current technology" "Skill and knowledge enhancing technologies" "Flexible production technology"
Quality	"Quality over product life" "Products with substantial value-addition" "First-time right design" "Short development cycle times"
Change	"Continuous improvement" "Culture of change"
Partnership	"Rapid partnership formation" "Strategic relationship with customers" "Close relationship with suppliers" "Trust-based relationship with customers/suppliers"
Market	"New product introduction" "Customer-driven innovations" "Customer satisfaction" "Response to changing market requirements"

Education	"Learning organization" "Multi-skilled and flexible people" "Workforce skill upgrade" "Continuous training and development"
Welfare	"Employee satisfaction"

Flexibility was born in Asia and effects all over the world with its outcomes. Agility is the answer for flexibility in the United States. Research in Iacocca Institute of Lehigh University work with the industrial parties to create a set of principles about preparing the United States' companies to the new century in 1990 (Baker, 1996; Dove, 1992). The main difference between flexibility and agility that flexibility mainly focused on the assembly line with the use of multiuse modules. Agility brings reconfigurable work modules and environment which is not limited to production. Agility captures and effects all organizational units inside a firm to be reconfigurable to be competitive in a fluctuating environment and market (Dove, 1993). The effected parts of a firm can be workforce, culture, organizational capabilities, technology and customer (Wendler, 2013). Figure 9 shows agility interdependencies in an organization (Wendler, 2013).

Figure 9: Agility interdependencies in an organization adopted from (Wendler, 2013)



Dimensions of agile competition classified into four categories. These categories can be summarized as follows (Baker, 1996):

i. "Enriching the customer"
ii. "Co-operating to enhance competitiveness"
iii. "Organizing to master change"
iv. "Leveraging the impact of people and information"

In the 70s and 80s economies of scale production provides high volume of standardized products to the customers without customization with its price advantage. After 80s increased competition, technology advancements are combined with customer preference changes on to use tailored products. For that reason, companies built agile competencies to provide tailored products and solutions to answer the consumer necessities. Firms which have different competencies come together to provide different products and services by mixing these competencies (Baker, 1996).

Companies create organizations that support different structures to reflect the variety of functions. All assets like people, information, technology inside the company quickly reconfigured to respond consumer requirements (Baker, 1996). Table 4 shows Agile research domain and their details (Žitkienė & Deksnys, 2018).

Table 4: Agile research domain and their details adopted from (Žitkienė & Deksnys, 2018)

Research Domain	Concepts	Authors
Agile Manufacturing	"Agility Drivers, Agility Capabilities, and Agility Providers"	(Sharifi & Zhang, 2001)
	"Agility drivers, agility enablers and outcomes"	(Vázquez-Bustelo, Avella, & Fernández, 2007)
	"Competence Management, Capability of Reconfiguration, Knowledge-driven Enterprise and Virtual Enterprise"	(Yusuf et al., 1999)

	"Agile strategy, agile processes, agile linkages, agile people"	(Meredith & Francis, 2000)
	"Customers, Relation with Suppliers and Competitors, IT use"	(Kisperska-Moron & Swierczek, 2009)
	"Technologies, empowerment, customer focus, supplier relationship, flexibility, and organizational culture"	(Dubey & Gunasekaran, 2015)
	"Agile practices, implementations and their efficiency effects."	(Leite & Braz, 2016)
	"Lean manufacturing, agile manufacturing, and supporting management and infrastructural practices have positive and complementary effects on firm's performance."	(Iqbal, Jajja, Bhutta, & Qureshi, 2020)
Agile Software development	"Agile software development, Agile manifesto"	(Kent Beck et al., 2001)
	"Extreme programming, Scrum, Feature-Driven development, Dynamic system development, adaptive software development, Crystal and Lean software development"	(Chow & Cao, 2008)
	"Potential sources of change and agile activities to address those changes: change creation, pro-action, reaction and learning"	(Conboy, 2009)
	"Critical success factor approach for agile software development: reduced time, reduced cost, increased quality"	(S. C. Misra, Kumar, & Kumar, 2009)

	"Knowledge management outcomes: knowledge creation, knowledge retention, and knowledge transfer"	(Chan & Thong, 2009)
Agile workforce	"Quality improvement, better customer service, improvement of learning"	(Hopp & Van Oyen, 2004)
	"Agile management, leadership influence on agility"	(Crocitto & Youssef, 2003)
	"Agile workforce effect on performance"	(Dyer & Shafer, 2014)

To sum up, in manufacturing, flexible enterprises can change production from a defined job to another easily. These job changes triggered by an external change in the environment mostly by consumer preference changes. Change in the demand can cause a model change of a product which can be met by the flexibility of the production. Rather than flexibility, organizational agility is an overall issue inside the firm which all departments or teams are working together to adapt the unforeseen and rapid change in the environment(Žitkienė & Deksnys, 2018). Flexibility focuses on production line, on the other hand agility focuses on the overall organization.

Organizational agility similar to agility explained as the organizational ability of flexibility to respond the environmental changes to accomplish sustained competitive advantage(Singh, Sharma, Hill, & Schnackenberg, 2013). Table 5 shows drivers of agility(Sharifi & Zhang, 2001).

Table 5: Drivers of agility adopted from (Sharifi & Zhang, 2001)

Source	Reason for change
Market	"Changes in Market Structure" "Changes in demand, needs/desires, fashion" "Fragmentation and Saturation of the market" "Power of buyer" "Product model proliferation" "Product lifecycle" "Price consciousness"
Competition	"Changes in competition environment" "Changes in competitor responsiveness" "Substitutes for products"
Customer preferences	"Changes in customer desires needs and wants" "Changes in expectations for price, quality, delivery time" "Changes in customer requirements homogeneity/heterogeneity"
Technology	"Technological changes" "New technology introductions"
Social factors	"Environmental pressures" "Changes in legislature and policies" "Changes in economy"

1.4.Organizational Agility Frameworks

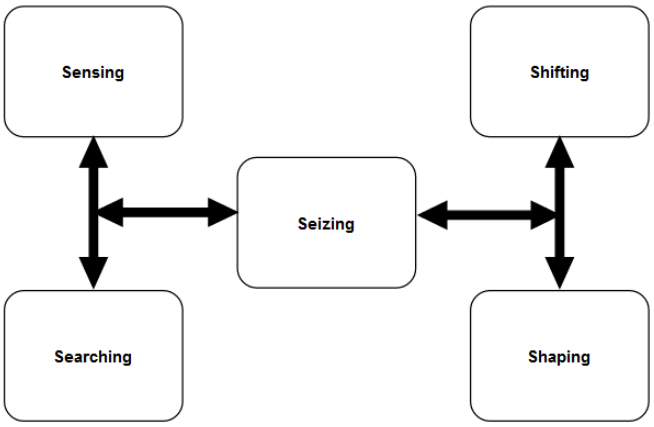
Agility is implemented widely by organizations in different geographies and is regarded necessary activity in the organizations which seems as a solution to survive in a high turbulent and competitive environments. Global competition pushes organizations to change and orchestrate all type of resources to become more responsive to unforeseeable future. Organizations, search ways to adapt to the new environmental conditions in the market and to explore, clarify environmental changes by investing on research and development activities to expend its knowledge base. Organizations can also build collaborations with partners to gain operational and financial performance (Srinivasan, Srivastava, & Iyer, 2020). Getting information from various resources and after that processing information to create or improve knowledge base is crucial to success on the highly volatile environment. The knowledge improvement activities increase the probability of right decisions to respond and adapt the change in the market (Deksnys, 2018).

There are different frameworks to explain the organizational agility. In these frameworks, different approaches are used to explain the organizational agility.

1.4.1. 5S Organizational Agility Framework

The 5S organizational agility framework defines the organizational agility as “the capacity for rapid, continuous and systematic evolutionary adaptation and entrepreneurial innovation directed at gaining and maintaining competitive advantage”. From the definition of 5S organizational agility framework, speed and plan are the featured properties of the model. Figure 10 shows the five capabilities in the 5S agility framework (Baškarada & Koronios, 2018).

Figure 10: 5S Agility Framework adopted from (Baškarada & Koronios, 2018)



Sensing and searching are the capabilities within the organization about identifying changes in the environment. These capabilities mostly refer to the external boundaries of an organization or a firm. Firms connect to the environment by their sense capabilities, which identifies opportunities and threats. In the organization inside, opportunities discovered by searching capability. These two capabilities are used to capture changes both inside and outside of the organization. In dynamic capabilities, these two capability combined into sensing to explain the external explorations and internal entrepreneurial activities (Baškarada & Koronios, 2018; Teece, 2007). Sensing activities are crucial for organization success. External sensing should focus on consumer behavior changes, competitor activities and also technological, political and scientific developments to be more proactive. There are various methods to be used to probing data from the external environment like horizon scanning and detecting weak signals. Searching and sensing methods provide forecasting and foresighting to the organization by using these techniques (Baškarada, Shrimpton, & Ng, 2016).

Seizing is the capability to plan strategy, business model and conversion(transformation) within the firm. In the 5S Organizational Agility framework seizing has a function to bridge between sensing, searching and shifting, shaping capabilities. Seizing capability uses the information gathered from the external and internal boundaries of the organization and translates gathered information for strategic decisions. Strategic decisions use it in the shifting and shaping capabilities as next steps of the framework (Baškarada & Koronios, 2018).

Shifting is the capability to achieve the strategies which are created in the seizing phase. Similar to the shifting, shaping is the capability to execute new skills to affect the environment. In shifting, organizations transform from one planned state to another planned state by using the previous activities. These changes triggered by the sensing and searching activities and mainly use for efficiency improvements, creation of new product and services, integration capabilities both on horizontal and vertical. The management team is the responsible for the change as an agent (Baškarada & Koronios, 2018).

The last dimension is shaping which is a result of all previous activities. From sensing environment to seizing and shifting, organization conclude implementing efficiency and affect the environment. By changing operational activities, which are directly related to the main operations of an organization, is the core of the shaping. The result of these operational areas and activities directly affects the environment (Baškarada & Koronios, 2018).

Organizations gain competitive advantage in a dynamic environment by implementing the five dimensions of the framework. Five dimensions in the proposed framework show every aspect of the agility and relations to each other in an organization or a firm.

1.4.2. Sense and Response Framework

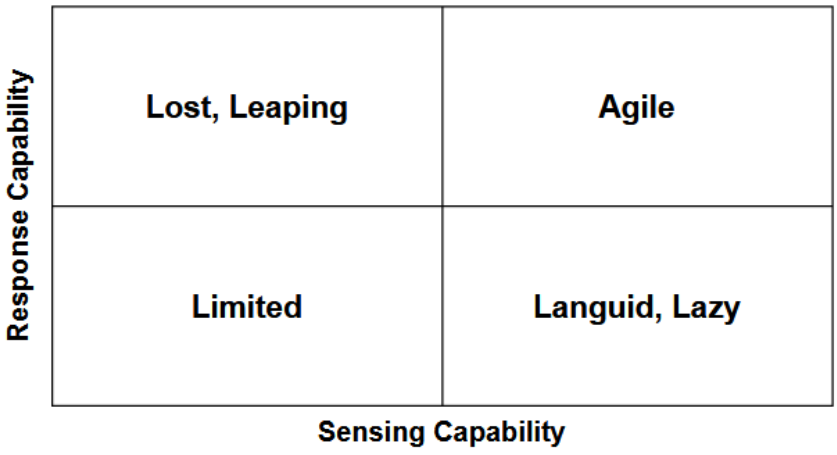
Sense and response framework is another proposed framework to explain the organizational agility. In the 5S organizational agility framework there are three main dimensions which are divided into total of five subdimensions. Different than 5S organizational agility framework, sense and response framework proposes two dimensions or capabilities which are sense and response.

In the sense and response framework, organizational agility defined as ‘the ability of firms to sense environmental change and respond appropriately’. There are different explanations to the terms about organizational agility, but at the end all descriptions are emphasize on similar things. Sense refers to knowledge management and environment change, respond refers to appropriate action regarding to the knowledge about the environmental change. Right actions taken by organizations achieved as competitive advantage, customer satisfaction, profit, market share and other market related results (Overby et al., 2005).

Consumer requirement changes, technological shifts, competitive landscape change or political changes are all directly effects the organization's competitive advantage level. Organizations benefited from these changes and use them to their internal capabilities when they recognize them appropriately. The recognizability is depended on experience, know-how, knowledge and organizational capabilities. Sense and response framework can be explained by two parameters as flexibility and speed. The flexibility and speed both work together makes an organization agile. Flexibility corresponds to response as the organizational reconfiguration and adaptability capability, and speed corresponds to sense as the detection and adaptation speed of external changes in an environment (Singh et al., 2013). Agility maturity can be high when it matches environmental changes with its organizational capabilities and capacities.

Sense and response framework includes reactive and proactive actions. Reactive actions are for firms to provide competitiveness in the environment. Proactive actions are the innovations that bring the companies to a leadership position in a competitive landscape. These two type of actions can be applied by different firms, but results can vary for each firm. Firms are seeking proactive actions to be a more attractive position in the market. Figure 11 shows sense and response framework in table form (Overby et al., 2005).

Figure 11: Sense and Response Framework adopted from (Overby et al., 2005)



In sense and response framework, high sensing and high response capabilities make an organization agile. From this point, firms which are sensing changes in the environment and

implement the appropriate responses which are suitable to the environmental changes can be defined as agile firm (Deksnys, 2018).

Economical political, customer requirements, technology and regulatory changes are the main reasons of the environmental volatility. Firms need to create various type of competencies to sense these changes before their impact on market realized. Organizations can build specific teams which are connected to the environment or can buy this kind of consultancy services. Marketing/sales activities are generally used for detecting consumer behavior which are supported by product based strategies. Innovation and research-development teams are use these activities for introducing new technologies or product/services to the organization. All activities about sense should be integrated to the rest of the organization to make the data flow seamless and responses can be planned related to the sensed information (Overby et al., 2005).

Some organizations can sense the environment but they cannot be responsive to the sensed changes because of immatured flexibility. Mostly their internal capabilities, which build the response capability is failed to work. For that reason in this type of organization, they can know what to do in the future for competition, but they don't turn collected information and knowledge into action like product development, supply chain, organizational hierarchy or decision making. This kind of organizations can be categorized as lazy (Deksnys, 2018).

The third type of organizations can have response capabilities which are well built, but they are not integrated to their sense capabilities or sense capabilities can be outsourced. Both reasons are creating a firm which is fast enough to catch the change. However, they are not catching the environmental change inside the firm which is the main trigger of the response. These organizations called as lost or leaping.

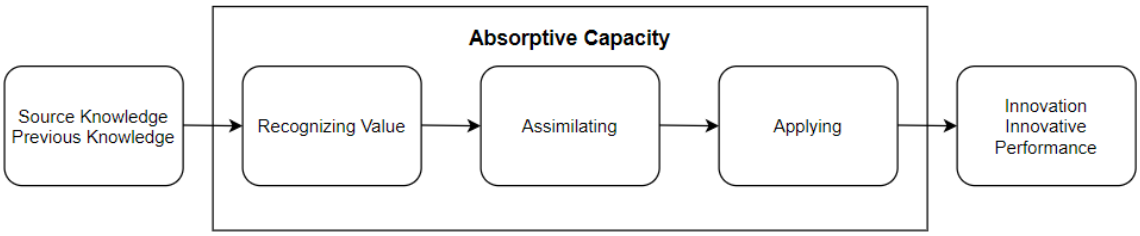
The last type is limited organizations, which have low response and low sense capabilities. These companies couldn't manage knowledge and drive their production capabilities without the knowledge about environmental change. For that reason, they have limited capability both in response and sense.

1.5.Absorptive Capacity

Absorptive capacity is the theory to make connection between dynamic capabilities and organizational learning. It can be described as the firm's capabilities to value, assimilate and apply new knowledge (Cohen & Levinthal, 1990). Absorptive capacity is the theory to explain the bridging activities between the organization itself and external environment. From the view of dynamic capabilities and organizational agility framework sense dimension activities are related to the absorptive capacity on organizational learning.

Absorptive capacity abilities are essential to build and maintain an innovation capacity by combining existing and new knowledge. Zahra and George formed the absorptive capacity in a different way and categorized into four abilities as; identify, assimilate, transform and apply external knowledge. The main target by applying these four abilities is to generate a dynamic organizational capacity. Firms use these abilities for knowledge creation and apply into organization to gain competitive advantage by using the knowledge to create different type of organizational capabilities such as marketing, sales etc. Organizational level absorptive capacity lean on each employee's capacity (Cohen & Levinthal, 1990). Absorptive capacity of total employees reflects the organizational absorptive capacity. Similar to resources in dynamic capabilities, which are reconfigured to increase the firm competitiveness in the market, knowledge inside the firm act as a resource inside the organizations (Zahra & George, 2002). Figure 12 shows absorptive capacity model from Cohen and Levinthal (Cohen & Levinthal, 1990).

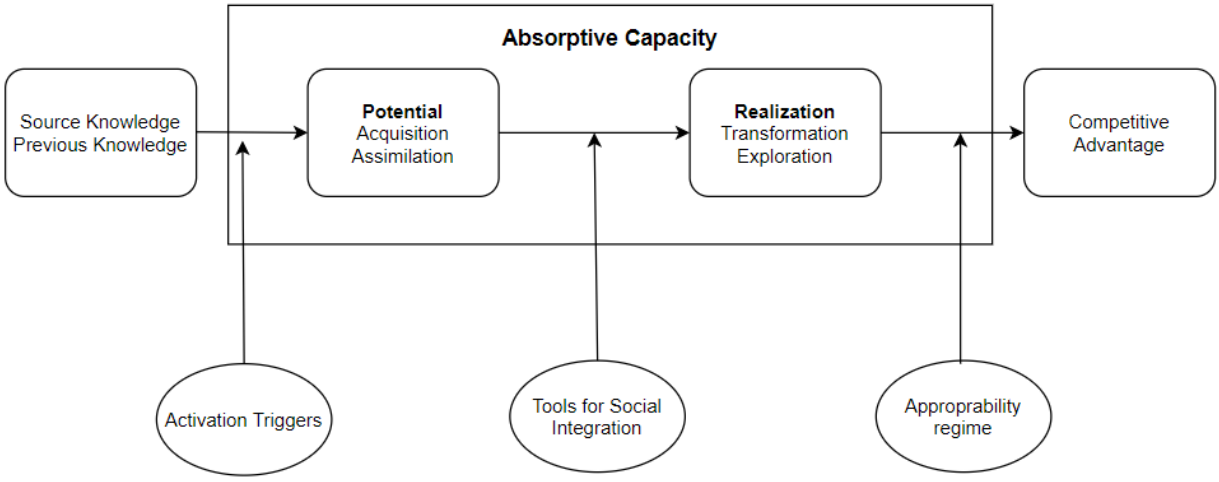
Figure 12: Absorptive Capacity Model of Cohen and Levinthal adopted from (Cohen & Levinthal, 1990).



As Cohen and Levinthal explained that to interpret the absorptive capacity, contact between external environment and the organization is the main point (Cohen & Levinthal, 1990). Zahra and George, extended the Cohen and Levinthal's approach and propose a model for absorptive capacity. The proposed model formed absorptive capacity abilities into two categories. The first one is potential absorptive capacity which includes knowledge acquisition and assimilation capabilities. The other two abilities, transformation and exploitation generates the second category as realized absorptive capacity. Potential absorptive capacity brings strategic flexibility to firms for adapting to fluctuating environments. Realized absorptive capacity use the existing and acquired knowledge to transform and reorganize the processes and routines inside a firm. Absorptive capacity implementation in a firm add or increase knowledge based assets inside the organization and this makes it a dynamic capability which also side effects to creation of other capabilities in the organization.

Potential and realized absorptive capacity are the two main categories inside the absorptive capacity. Potential absorptive capacity have an interaction with external environment and realized absorptive capacity is an inner organizational ability. They can be implemented as separate abilities, but without realized absorptive capacity the acquired and assimilated knowledge cannot be used to in the organization to capability increase. Similarly without potential absorptive capacity, realized absorptive capacity couldn't get a knowledge input to transform and exploit inside the organization. They are all mandatory abilities to build and maintain inside the firm. Agile organizations are needed to implement absorptive capacity because of increased absorptive capacity provide innovation capacity (Martinez-Sanchez, Perez-Perez, & Vicente-Oliva, 2019). Figure 13 shows absorptive capacity model of Zahra and George (Zahra & George, 2002).

Figure 13: Absorptive Capacity Model of Zahra and George adopted from (Zahra & George, 2002)



Acquisition is the first dimension which the firm can connect to external environment to detect and take into the knowledge. In the acquisition, firms can identify and acquire external knowledge. The main reason to acquire and identify the external knowledge is to use in main operations. Intensity, speed and direction are the three main determinants of the quality of the acquisitions capability of a firm. The more a firm put intensity and speed on acquisition then the capability can be built quickly. It's a crucial activity which also triggers the next assimilation dimension.

In the assimilation, the information from the external environment is processed to use inside the organization. A set of routines and processes use to interpret and investigate the external data. These are main elements to convert raw external data to use inside the organization. The main blocker on the quickness is the firms learning speed to acquire the new knowledge. Mainly the resources' learning durations cannot be shortened so the absorptive capacity. The direction factor also determines the variety of external resources to acquire (Zahra & George, 2002).

Acquisition and assimilation are the dimensions of potential absorptive capacity which are mainly build bridge between the outside environment and the internal organization. Realized absorptive capacity has the dimensions of transformation and exploitations. In the transformation dimension acquired and assimilated knowledge used as an input. Combination of existing, acquired and assimilated knowledge used in this dimension to convert them into a new knowledge with additional routines. The organization can delete existing knowledge or add to the existing

knowledge or clarify the knowledge in different ways. The transformed knowledge triggers the entrepreneurial activities and foresights the future clearly (Zahra & George, 2002).

Exploitation is the last dimension in the realized absorptive capacity which is used acquired, assimilated and transformed knowledge as an input. These inputs imply to enhance or increase the existing competencies inside the organization. In the exploitation, systematic routines are important to achieve successful competency development. These routines can be a process such as building a new department or system (Zahra & George, 2002).

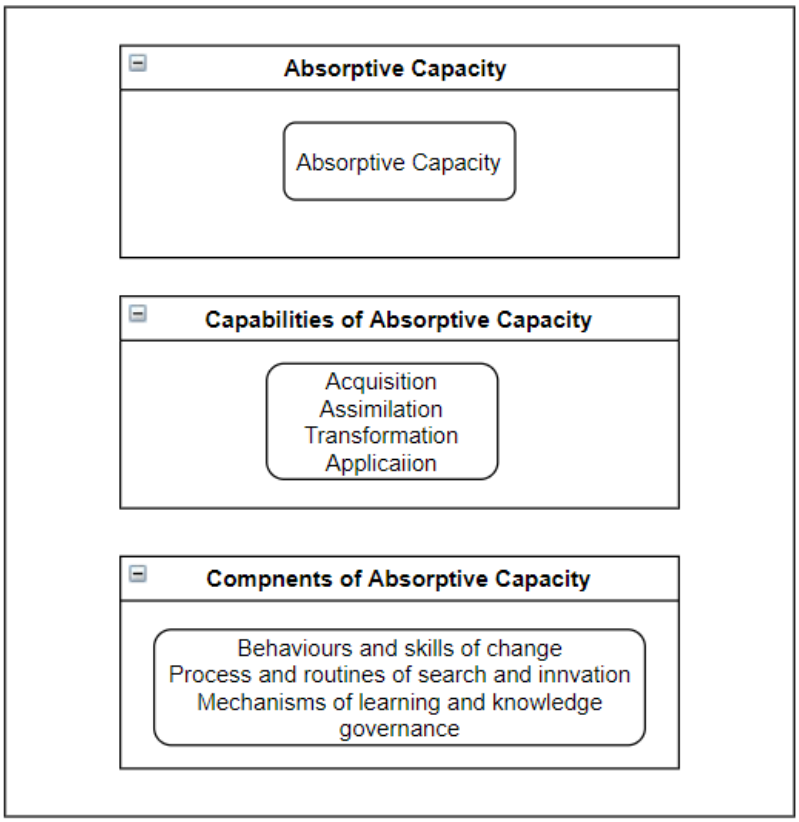
The work on absorptive capacity put different aspects over the dimensions as acquisition, assimilation, transformation and exploitation. The total value of integrated dimensions are greater than the total value of singular dimensions. Firms implement absorptive capabilities by implementing the full dimensions inside the organizations. The absence of acquisition part, make the effects of assimilation, transformation and exploitation limited. Acquiring new knowledge inside the organizations need an integrated view and approach (Daspit & D'Souza, 2013). Table 6 shows components and organizational mechanisms of ACAP (Cappellari, Welter, Hermes, & Sausen, 2019). Figure 14 shows components of absorptive capacity (Cappellari et al., 2019).

Table 6: Components and Organizational Mechanisms of ACAP adopted from (Cappellari et al., 2019)

1. Behaviors and skills for change and innovation
• "Behavior is the direction and commitment to change." • "Behavior that emphasizes loyalty and commitment to change." • "The main characteristics of skills are pragmatism, tacit knowledge, and choices. Pragmatism involves skills following the steps which are successively triggered. Knowledge within the skills is largely unspoken, that is, the actor in the performance of a certain skill is not aware of the details of his performance. Also, skills encompass choices, which are in its majority, automatically selected." • "The skills include: 1. identifying and capitalizing market opportunities as well as recognizing the value of external information, assimilating it and applying it commercially;

2. quickly developing new strategies, even better than the competition, and learning how to learn; 3. non-specific skills, not necessarily connected to the execution of the operational routine, such as: communication, negotiation, conflict resolution, leadership, economic analysis of ideas, problem solving, project and people's management.”
2. Routines and search processes or innovation
• “Repeatable patterns of behavior in order to connect actors in a given context. Projected along with the work process or emerging independently, as long as actors find more effective ways of performing their tasks. Represent the execution of the work structure.” •” Routines keep the organizations committed to providing goods and services, and they are sustained over the pass of time, explaining this way how organizations work.” • “Routines are learned behaviors, which can be designed along the work process or arise independently, as individuals find more effective ways to perform their activities.” • “Processes encompass all the capabilities needed to turn inputs into desired results. This includes specifications, technology, tools, procedures, policies, practices, and methods.” • “Processes provide the structure for work. They refer to the continuous sequence of facts that happen with some regularity. Once the processes establish the routines, without those routines, they will cease to exist.”
3. Mechanisms of learning and knowledge governance
• “A set of procedures for acquisition, distribution, and interpretation of knowledge and the register of organizational memory.” • “Enable the continuous renewal of individual and organizational practices, impacting outcomes at different levels.” • “Make processes of change easy and effective. They emphasize the multidisciplinary work groups, the establishment of committees, the delegation of responsibilities, and the intensification of information exchange among departments as organizational mechanisms.”

Figure 14: Components of absorptive capacity adopted from (Cappellari et al., 2019)



1.5.1. Knowledge Absorption in The Organization

Knowledge is the processed type of data and information (Alavi & Leidner, 2001). Tacit or explicit knowledge are the two main knowledge type inside the organization. Tacit knowledge refers to the embedded knowledge which is gained by experience or doing the job. When knowledge transferred from minds to documents, books and other type of knowledge recording tools then it turned into explicit knowledge. Tacit knowledge is difficult to extract and captured inside employees or working processes.

Explicit knowledge with its nature is objective, easily understandable and sharable by lots of people inside the organizations. It can be structured that a new team member or employee can easily understand by using the explicit knowledge. On the other hand, tacit knowledge is so personal and subjective. It built by the personal experiences and processes which turns it to a highly

difficult to share and capture. Tacit knowledge is hard to transfer to anybody or team and includes human interpretation (Virkus, 2014).

Similar to the absorptive capacity, knowledge absorption has steps as integration, sharing and access (Rafique, Evans, Nawaz, & Agha, 2015). Knowledge integration is a key aspect of knowledge management. Inside the organizations, different type of knowledge stored in documents or databases and easily accessed by the authorized employees. Especially in the mid management, employees store new knowledge as tacit and it's hard to turned them to explicit. Without turning to explicit, tacit knowledge can be disappeared with the loss of employees. Knowledge integration refers to turning tacit knowledge into explicit knowledge.

Knowledge sharing is another aspect that employees are needed to share knowledge inside the departments or cross functional teams. In general, common knowledge shared between employees by different knowledge sharing interaction activities. Formalized and high frequency interaction sessions increase the effectiveness of the knowledge sharing. Critical knowledge rather than common knowledge should be shared within the organization which is mostly kept as tacit knowledge.

Knowledge integration and sharing are so important for an organization. Knowledge access supports these two steps by enable employees to critical information. Most of the common knowledge can be reached by most of the employees but the critical knowledge is restricted to specialized employees. Employees need special access request to these specific information.

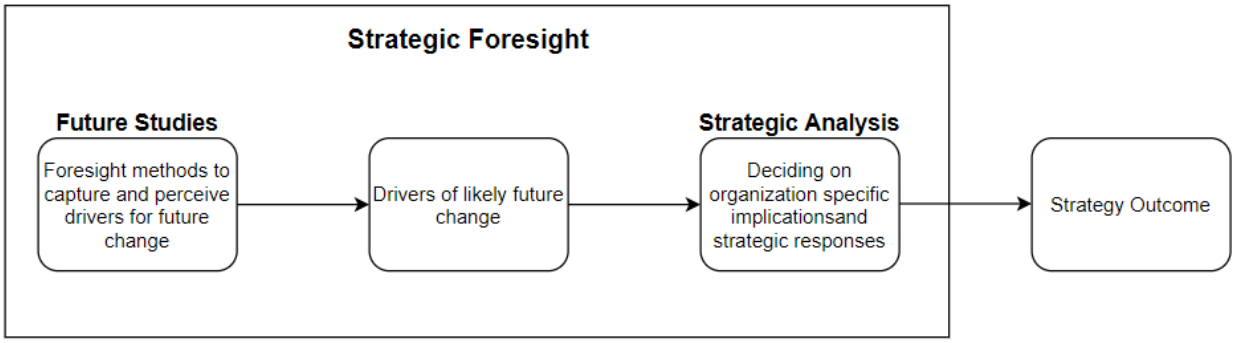
1.6.Corporate Foresight

Fluctuations in industrial sectors and environment are increased in the last decades especially in technology and areas which is shaped by consumer demand. The uncertain environment creates problematic decision areas inside organizations and firms. Strategic planning is the most effective activity of the decision making inside the organizations. Strategic planning includes processual and formalized generation of organizational strategy and mainly uses the satisfactory and correct information about organization's future operational environment (Ansoff, 1991; Porter, 1997). Methods and practices, which are commonly used in strategy creation are evolved to a new level

to be effective in a volatile environment. Forecasting or future orientation tools and methods are implemented to generate strategy under uncertain times.

In the literature strategic foresight and corporate foresight are widely used as an umbrella term to capture the all future oriented methods and practices (Rohrbeck, 2012; Rohrbeck & Schwarz, 2013; Vecchiato, 2012). Criticisms about forecasting is, it can be useful at near future and be accurate but in the middle and long term, it is not possible to make an accurate prediction due to high volatility in the aspects of economical, demographic and technological areas. These scholars support the strategic agility or flexibility, which makes organizations to be reactive over changes and quickly adapts to changes. These adaptive approaches refuse planning activities which is commonly used in the previous decades by organizations (Prahalad, C.K., O'Neal, D., Hamel, G. and Thomas, 1998). Reactive or adaptive ways are avoid prediction and concentrate on to understand change to react them. Figure 15 shows a conceptualization diagram of strategic foresight (Iden, Methlie, & Christensen, 2017).

Figure 15: Conceptualization of strategic foresight adopted from (Iden et al., 2017)



Strategic foresight give opportunities and ways to make decisions under high volatile environment. These approaches include tools, practices and methods to provide sufficient knowledge to make decisions (Vecchiato, 2015). There are three assumptions about foresight which are first mentioned in Berger's article as:

- "Multiple futures are possible" (Berger, de Bourbon-Busset, & Massé, 2008)
- "Change (drivers) can be identified and studied" (Berger et al., 2008)
- "The future can be influenced" (Berger et al., 2008)

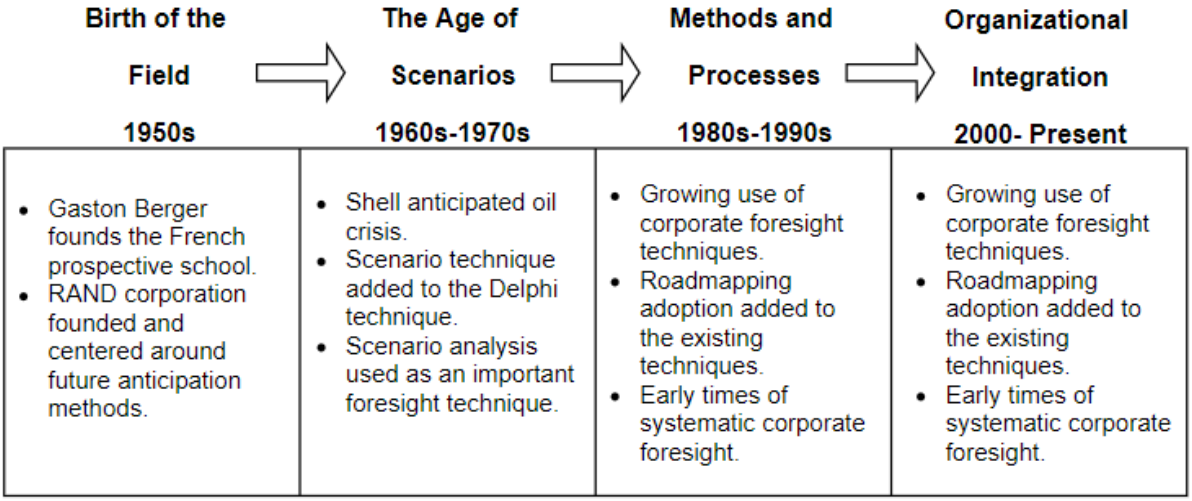
Foresight definition can be extended into six dimensions by Fagerheim (Rialland, n.d.);

- "What characterizes foresight in the systematic approach to future uncertainties ensured by the use of specific methods such as scenario-building"
- "Further, the engagement of various stakeholders is crucial for the pertinence of the foresight's outcome"
- "The quality of the foresight will then be determined by the quality of information and knowledge collected for the project, and helping to better apprehend the future through identification of trends and drivers"
- "Foresight projects typically operate with a medium to long-term perspective. Foresight studies support strategy development by helping establish common mental maps and visions"
- "The outcome of a foresight project must be relevant for decision-making and therefore must look at elements in the future that are believed to have an impact on future activity"

Scientific roots of strategic foresight can be started from the beginning of 20th century. At these times especially governments use long term planning for shaping development. These plans can be accurate due to predictable and nonvolatile environment. These planning works continued till World War 2. After World War 2 scientific attitude added to the existing forecasting works and prospective studies evolved in 1950s. After this time especially in the Europe both governmental and corporate decision makers use long-term future possibilities in their decision cycle.

Rene Rohrbeck divides the history of the field into four different periods. The first period is the birth of the field, which is started in 1950s and ended in the beginning of 1960s. Implementation and active usage of this technique started the age of the scenarios between 1960s and 1970s. Different corporate foresight techniques were used and adopted systematically by various type of companies between 1980s and 1990s. After 2000, foresight methods are integrated with existing organizational processes. Figure 16 shows the historic view of corporate foresight development (Rohrbeck, Battistella, & Huizingh, 2015)

Figure 16: Corporate foresight development history adopted from (Rohrbeck et al., 2015)



Gaston Berger from the French prospective school and Herman Kahn from Rand Corporation developed and implemented various techniques which are used in the foresight works (Berger et al., 2008; Gordon, Ramic, Rohrbeck, & Spaniol, 2020; Weick, Sutcliffe, & Obstfeld, 2005). Foresight term first used in the book of Alfred North Whitehead and explained as capability to perceive complexity of societies. This explanation still used and enough to explain the corporate foresight. Organizations need to provide foresight capability by using past and present data to anticipate future. Delphi surveys are the most common tool for foresight activities. Scenario planning is also extensively used by the organizations and firms to determine alternative futures (Gordon et al., 2020).

1960s is the period that companies used foresight methods and resulted successfully. The use of scenario program succeeded to determine the probable futures and this result used inside the companies for their decision making mechanisms. These methods are useful than the traditional decision making techniques and largely used by the major firms.

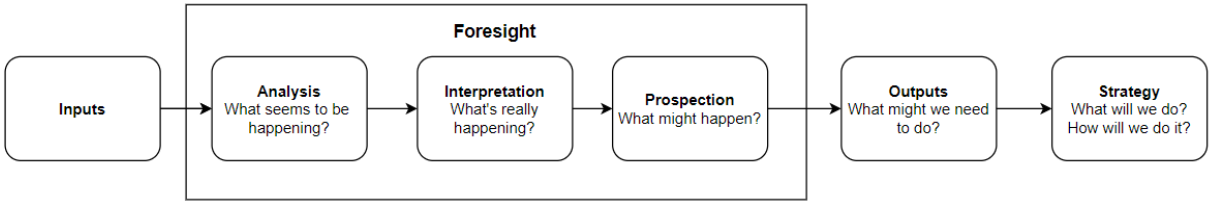
The major global change both in economic and political side in 1980s change the corporate environment into a complicated atmosphere. The new environment is high competitive and pushes companies to provide organizational learning practices and innovation capabilities. For that reason, new tools like technology roadmapping is introduced and used by the major companies. Periodical foresight analysis changed into continues analysis with a dedicated group of people (Gordon et al., 2020).

Organizational practices are implemented after 2000s and companies extensively used the foresight techniques effectively. There are new type of challenges appeared onto the firms which are the filtering appropriate data from the huge amount of data and the others are the decision makers' limited time and focus on the data. To overcome these two problems, companies can outsource the data analysis process to the contractors or consulting firms which is resulted a filtered data for the decision makers. New technological tools used to process extensive data for the use of the strategic management departments or decision makers. With the help of new approaches for data analysis, companies can shortened the data analysis phase and effectively use them inside their decision making processes. In these period, these foresight practices are also integrated to the existing organizational processes.

1.6.1. Corporate Foresight Frameworks

Different foresight frameworks designed with various views. In general, frameworks have three main steps which are inputs, outputs and the foresight activities to do in an organization or firm. Voros, created a framework which all foresight activities used for the strategy (Voros, 2003). In this framework foresight box divided into three as analysis, interpretation and prospection. Figure 17 shows the foresight framework with its relation to inputs and outputs (Voros, 2003).

Figure 17: The foresight framework adopted from (Voros, 2003)



Analysis phase is the preparation step that especially investigates what seems to be happening in the future. Trend analysis, cross-impact matrices and similar analytical methods can be used in

this step. In the interpretation phase, the data from the analysis phase deeply investigated and seek for potential insights. In this phase, systems thinking and causal layered analysis methods are used. Data, information and knowledge which are collected and generated, are used in the prospection stage. From these inputs, alternative futures can be generated by using scenarios, visioning normative and backcasting methods. Companies or organizations can view what might happening in this phase and they can generate the needs as an output of all the stages (Slaughter, 1989; Voros, 2003).

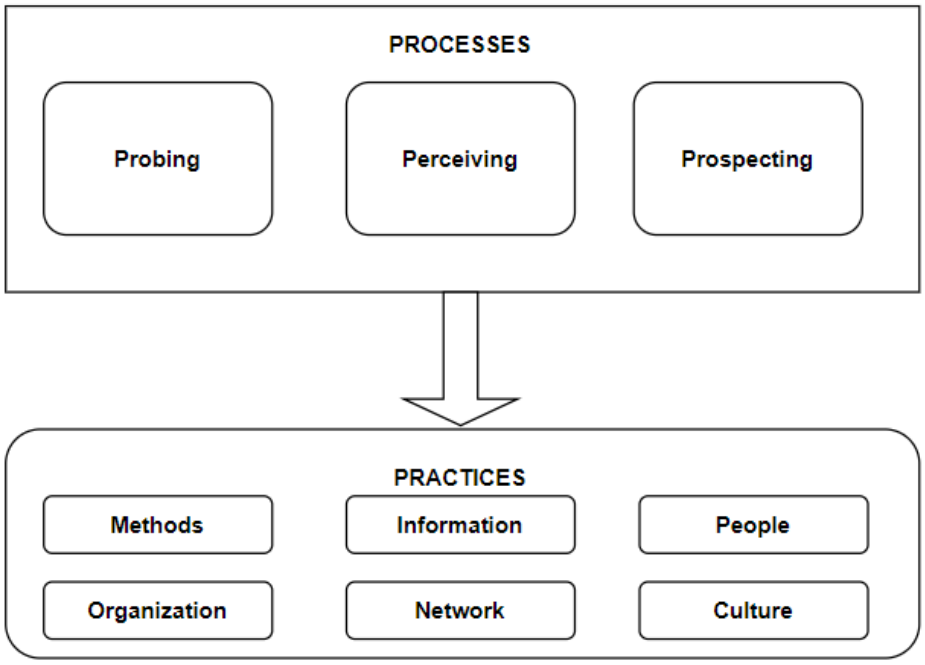
At last, all inputs from the foresight process feeds the decision makers to make decisions and generate strategies. From beginning to end all steps should be continues and provide feedback loops to improve the overall process.

Corporate foresight maturity model which is structured by Rohrbeck, have introduced the foresight framework which supports with the maturity model. The whole foresight activities divided into three processes which are probing, perceiving, prospecting (Rohrbeck, 2011). Perceiving includes the practices which are used to find the main reasons behind the drivers of change in the environment (Ansoff, 1980; van der Duin & den Hartigh, 2009).

Practices which are used in the prospecting, are used for sensemaking by using the tools like scenario analysis, analogies and backcasting. At last in probing, practices are aimed to make experimental search (Ahlqvist & Rhisiart, 2015; Daft & Weick, 1984).

These two framework have similarities on processes and in the second framework there are detailed practice groups which are related to maturity model. These practices can be used to measure the organizational foresight readiness. Figure 18 shows the diagram of corporate foresight maturity assessment model (Rohrbeck, 2011).

Figure 18: Corporate Foresight maturity assessment model adopted from (Rohrbeck, 2011)



1.6.2. Corporate Foresight Maturity Model

Existing processes, methods and practices are used in organizations to maintain the business. Foresight methods need to be evolved to a next level to survive in the market. For that reason organizations and companies compare and benchmark their managerial practices to improve the existing ones or implement the better ones. For that reason common frameworks are used to measure and compare. Different maturity models for diverse purposes used in different sectors and firms (Rohrbeck, 2011).

For the corporate foresight a maturity model established by Rohrbeck and used in different companies. The maturity model focuses on five dimensions which captures the whole areas about foresight (Rohrbeck, 2011). Details of five dimensions are shown in below list with Table 7 and Table 8 data. Corporate foresight maturity model diagram is shown in Figure 19.

- "Information usage interested on how does a firm sense and absorb data?"

Table 7: Elements of information usage adopted from (Rohrbeck & Gemünden, 2008)

Element	Description	Authors
Reach	"How deeply scans current, adjacent businesses and white spaces."	(Reger, 2001; Rohrbeck & Gemünden, 2008)
Scope	"How broadly scans technology, socio-cultural, customer, competitors, political environment."	(Becker, 2002; Jain, 1984; Rohrbeck & Gemünden, 2008)
Time Horizon	"The time horizons of foresight activities."	(Becker, 2002; Rohrbeck & Gemünden, 2008)
Sources	"Sources of information."	(Becker, 2002; Jain, 1984; Rohrbeck & Gemünden, 2008)

- "Method sophistication interested on how are methods used to interpret data?"

Information usage explains which type of information can be used in foresight activities. On the other hand, method sophistication interested methods, which are used systematically to process information and became knowledge. Possible methods can be scenario technique, Delphi technique, cross-impact analysis, backcasting and gaming (Rohrbeck, 2011).

- "People and networks interested on how is data translated through informal means into actionable insights?"

People dimension meaures the maturity of foresighters. Foresighter professionals should be capable enough to enable foresight activities inside the organization. T-shaped characteristics are the key for these people. They should be expert in one domain, which easily transfer his knowledge to others inside the organization. Expertise in one area is not enough, they have interest on different topics and should have enough knowledge about them. They should be curious and have different

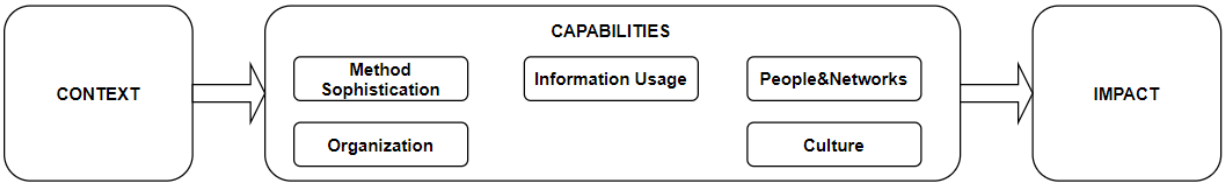
interest on external knowledge by using their extensive external network. At the end all gathered information shared by foresighters inside the organization by their internal network contacts.

Table 8: Elements of the capability people and networks adopted from (Rohrbeck & Gemünden, 2008)

Element	Description	Authors
Characteristics of foresighters	"The degree to which characterics of the foresighters meet the ideal characteristics."	(Rohrbeck & Gemünden, 2008; Wolff, 1992)
External Network	"The extent and intensity of external ties"	(Rohrbeck & Gemünden, 2008; Wolff, 1992)
Internal Network	"The extent and intensity of internal ties"	(Rohrbeck & Gemünden, 2008; Wolff, 1992)

- "Organization interested on how is data translated through formal mechanisms such as processes into actionable insights?"
- "Culture interests on how do aspects of organizational culture promote or prevent the translation from data into actionable insights?"

Figure 19: Maturity model framework adopted from (Rohrbeck, 2011)



Corporate foresight have relationship with dynamic capabilities. Dynamic capabilities defined by Teece as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece & Pisano, 1994)". On the other hand, Barreto generate a new definition as "A dynamic capability is the firm's potential to systematically

solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base (Barreto, 2010)". From these definitions, companies or organizations need to build close relationship with its environment which includes customers, partners, suppliers and technology. Environment observations and insights can be done by anticipatory tools and methods which are part of the corporate foresight (Schwarz, Rohrbeck, & Wach, 2020).

Corporate foresight capabilities can be grouped into three categories. Perceiving includes the practices which are used to detect and determine the elements of environmental change. Firms which are detect weak signals prior than their competitors then they receive competitive advantage. In the prospecting phase, firms are used tools and methods like scenario planning, backcasting to involve sensed data to the strategy process. In the probing phase, firms use experimentation tools like prototyping, consumer surveys and venturing. The main aim is to make activity about the insights and information (Rohrbeck, 2011). All these foresight activities and phases are used to improve firm level competency and abilities about strategy and enable foreseeable future into the strategy process. These activities and practices have positive impact on dynamic capabilities outcomes. Dynamic capabilities outcomes can be classified as innovation, evolve strategies based on trends and successfully reconfigure resources by the new strategies (Schwarz et al., 2020).

1.7.Relationship Between Strategy Theories

Organizational agility depends on other strategic management theories which are built to explain different aspects of organizations in volatile environments. These theories are dynamic capabilities (David Teece & Pisano, 2003), absorptive capacity (Overby et al., 2005; Zahra & George, 2002) and corporate foresight (Rohrbeck, 2011).

1.7.1. Dynamic Capabilities and Organizational Agility

In rapidly changing and uncertain environments, organizations build organizational agility capabilities to survive and be competitive. This type of uncertainty can be managed by improving innovation capabilities inside the organizations. Organizational agility can be provided and supported by strong dynamic capabilities to understand the uncertainty and manage inside the organization. Rapid technological change and technological, financial disruptions are the main reasons of the uncertainty and dynamic capabilities are essential to overcome these uncertainties.

In the 70s and 80s economies of scale production provides high volume of standardized products to the customers without customization with its price advantage. After 80s increased competition, technology advancements are combined with customer preference changes on to use tailored products. For that reason companies are built agile competencies to provide tailored products and solutions to answer the consumer problems. Firms which have different competencies come together to provide different products and services by mixing the competencies (Baker, 1996).

In dynamic environments, firms can focus on external environment and internal capabilities like resource based view. Both market focus and resource based view are not enough to maintain sustained competitive advantage in dynamic environments. The need in such an environment is difficult to replicate dynamic capabilities (Teece, 2007). Dynamic capabilities fill the gap between market focus and resource based view strategies. Agility is the organizational capability to sense and response rapidly in a volatile environment within the sense and response framework in dynamic capability strategy. In this perspective organization agility can be described as a portion of dynamic capabilities (Overby et al., 2005).

Increased uncertainty, volatile market and unpredictable demand have made organizations and firms to respond and change to remain competitive or increase competitiveness (Teece et al., 2016). All these external and dynamic effects push firms to build internal capabilities to respond effectively not to lose competitive advantage.

Agility is the answer for flexibility in the United States. Research in Iacocca Institute of Lehigh University work with the industrial parties to create a set of principles about preparing the United States' companies to the new century in 1990 (Baker, 1996; Dove, 1992). The main difference

between flexible and agile that flexibility mainly focused on the assembly line with the use of multiuse modules. Agility brings reconfigurable work modules and environment which is not limited to production. Agility captures the all organizational units inside a firm to be reconfigurable to be competitive in a fluctuating environment and market (Dove, 1993). The effected parts of a firm can be workforce, culture, organizational capabilities, technology and customer.

Dimensions of agile competition classified into four categories. These categories are (Baker, 1996):

i. "Enriching the customer"
ii. "Co-operating to enhance competitiveness"
iii. "Organizing to master change"
iv. "Leveraging the impact of people and information"

Dynamic capabilities which is mentioned detailed in the previous section have three main dimensions: Sensing, seizing and transforming. Sensing refers to searching, and identification of changes in the environment. Seizing refers to reconfiguration of resources inside the organization and at last transformation refers to continued renewal. These three dynamic capabilities dimensions are mandatory to sustain in a volatile, uncertain environment (Teece et al., 2016).

Using sense as an organizational agility means that organizations need to sense future to generate insights to dynamically adjust its resources to be competitive. Future term means the possible options in the future which can be sensed or generated. There are some tools which are used in corporate foresight like scenario planning, generative sensing and sense making. By using these tools and sensing opportunities or threats before its competitors is critical for an organization.

Implementation of seizing is the most effective part of agility. Reconfiguring resources which make them flexible, transform firm to a low level hierarchical structure. Innovation processes implemented inside the organization are the processes or actions in seizing. These are which are also increase organizational agility.

Transformation dimension is hard to implement inside large organization, but with the effective management it can be possible. All sensing, seizing and transformation are all support agility inside the organization. Organizations which have strong dynamic capabilities can sense the environment better than the other organizations.

1.7.2. Absorptive Capacity and Organizational Agility

One of the main objective of absorptive capacity is bridging activities between the organization and the external environment with defined organizational processes and routines. Volatile environment in terms of competition, customer requirement changes and technological advancements which firms need to sense and response these changes, are a part of their operation under organizational or strategic agility. Absorptive capacity is a related concept which is used in organizational agility framework (Overby et al., 2005).

Absorptive capacity routines are used by organizations as acquire, assimilate, transform and exploit knowledge to enable dynamic capability inside the organization. Potential absorptive capacity, which includes acquiring and assimilating knowledge, have similarity in sense part of sense and response framework in organizational agility. On the other side, realized absorptive capacity which includes transforming and exploiting knowledge have similarity to the response part of sense and response framework (Overby, Bharadwaj, & Sambamurthy, 2006). Unlike the similarities between absorptive capacity and organizational agility, absorptive capacity inside a firm, focuses on the ability to manage knowledge and organizational agility, concentrates on the abilities to handle change (Overby et al., 2006).

Both potential and realized absorptive capacity processes are needed to add or increase the organizational capability to be competitive in the market or environment. On the other hand, fluctuating and uncertain environments over the last decades force organizations to be agile in competitive markets and environments. Organizational agility, with its definition similar to absorptive capacity conceptualized as dynamic capability with the sense and response capabilities (Verma, Bharadwaj, & Nanda, 2017).

From other view, dynamic capabilities depend on organizational level absorptive capacity. Existing or gained knowledge inside the organization can be an input for dynamic capabilities to enable new outputs which can add competitive advantage to the organization. The knowledge which is gained by the organization enables itself to sense new external changes related to potential areas (Ashrafi et al., 2005).

1.7.3. Corporate Foresight, Dynamic Capabilities and Organizational Agility

Uncertainty and volatility in the environment is creating threat and hardly manageable atmosphere inside the firms and organizations. To overcome these threats and challenges organizations should implement dynamic capabilities inside the organization. Dynamic capabilities increase the company capabilities and help to manage the organizations in unforeseeable future (Teece et al., 2016).

Traditional management architecture and approaches are not enough to handle such a highly changing and complex environment. Top-down information and control flows, mid and long term planning, function and silo based structure are blockages in an organization to overcome the new problems. For that reason, building sensing capability is crucial for firms to handle all type of changes inside the company. Strategic foresight is an important concept to build these capabilities inside the organizations as dynamic capabilities (Haarhaus & Liening, 2020).

Organizations need to detect risks, opportunities and every kind of change in the environment. Strategic foresight, methods and practices are useful to add capability to sense its probable future in the environment (Vecchiato, 2015). These methods and practices are also enable or improve organizational flexibility for fast response to the change (Haarhaus & Liening, 2020).

In dynamic capabilities, the main aim is to sense the possible risks, threats and opportunities before its competitors and reconfigure its resources for the desired gains. Corporate foresight provides methods and practices to build inside the organization to effect on dynamic capabilities. Corporate foresight has three processes to build in organizational level which is detailed in Table 9 (Schwarz et al., 2020):

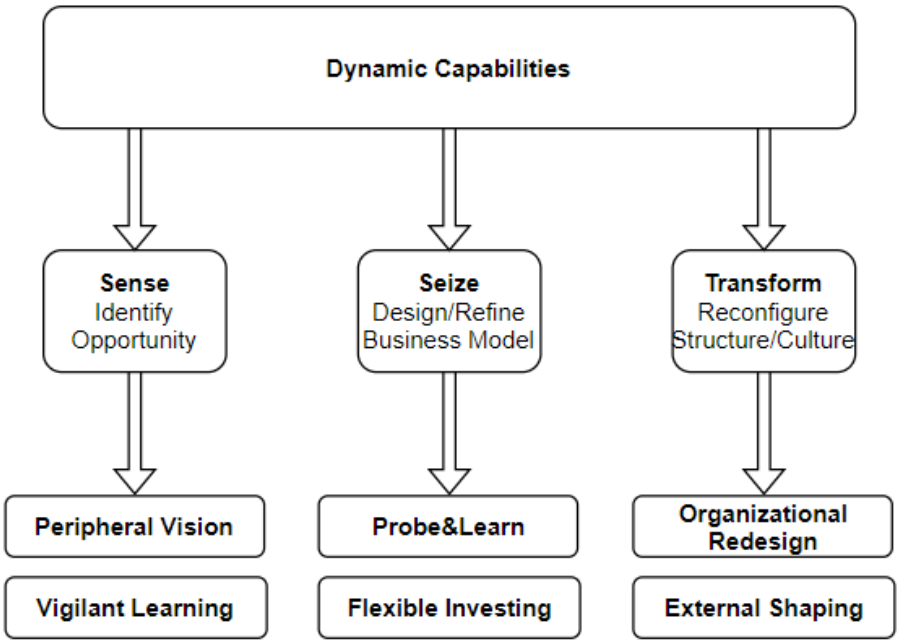
Table 9: Corporate foresight process details adopted from (Schwarz et al., 2020)

Processes	Description
Perceiving	"Practices that firms use to identify the factors that drive environmental change. These firms aim to identify (weak) signals ahead of competition to gain a lead-time advantage."
Prospecting	"Practices through which firms engage in sensemaking and strategizing. Practices include working with analogies, scenario analyses, system-dynamics mapping, and backcasting. In addition, these firms aim to foresee the right time to act by identifying tipping points. The aim of this phase is to gain an insight advantage, which permits the firms to identify a superior course of action that is different from the status quo of the industry."
Probing	"Practices through which firms move from what Gavetti and Levinthal called "cognitive search" in the perceiving and prospecting phase to "experimental search." Probing practices are often enacted in dedicated accelerator units and may include prototyping, R&D projects, consumer tests, internal venturing, strategic initiatives, and external venturing. Probing practices aim at legitimizing and starting a new course of action and ultimately at gaining a competitive advantage."

In addition to organizational level foresight capabilities, there is also individual capabilities. Individual capabilities includes managerial capabilities which are managerial cognition, managerial social capital and managerial human capital. Similar to the organizational sensing capabilities managerial capabilities should also include identifying opportunities and threats. By identifying opportunity and threats, managerial capabilities should make decisions about the identified information which is similar to the seizing in dynamic capabilities. The last capability is to reconfigure resources related to the sensing and seizing activities (Haarhaus & Liening, 2020). For individual level, six capabilities mentioned in the literature as anticipate, challenge, interpret,

decide, align and learn (Day & Schoemaker, 2016). Dynamic capabilities relation to leadership discipline detailed in Figure 20.

Figure 20: Leadership disciplines link to dynamic capabilities adopted from (Schwarz et al., 2020)



1.8.Agility in Software

Organizational agility frameworks, practices and methods are being structured for manufacturing for the first time since beginning till 2000s. Most of the strategic analysis and models built for firms are generally work in product development sectors. For that reason theories and practices are mostly covered by companies which are mainly active in manufacturing. Software in its nature is different than manufacturing but for a long time it's managed dominantly as a manufacturing product. As a result of this, software companies build processes similar to manufacturing.

Software agility similar to product agility, which is emerged in 2000s to serve in high volatile and changeable consumer requirements and markets. Environmental changes have effect on software businesses like other sectors. For that reason, organizations seek ways to be agile in their software organization(P. Tallon et al., 2019). Agility changes software organizations from hierarchical, silo based and single focused structure to self-organized and t-shaped with the support of continues delivery and continues improvement activities. Different agile software development definitions are listed in Table 10 (G. Lee & Xia, 2010).

Table 10: Agile software development definitions by authors adopted from (G. Lee & Xia, 2010)

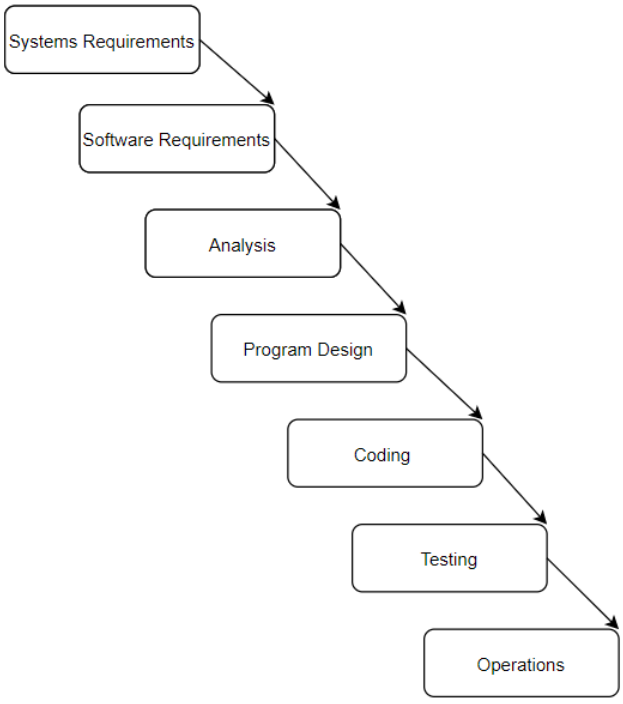
Construct	Literature	Relevant Definitions/Concepts/Ideas
Software development agility	(Conboy, 2009)	"Agility is defined as the continual readiness of an entity to rapidly or inherently, proactively or reactively, embrace change, through high-quality, simplistic, economical components and relationships with its environment"
	(Jim Highsmith, 2004)	"Agility is the ability to both create and respond to change in order to profit in aturbulent business environment; it is the ability to balance flexibility and stability"
	(Larman, 2004)	"Agility is rapid and flexible response to change"
	(Erickson, Lyytinen, & Siau, 2005)	"Agility is associated with such related concepts as nimbleness, suppleness,quickness, dexterity, liveliness, or alertness; it means to strip away the heaviness in traditional software development methodologies to promote quick response to changing environments and changes in user requirements"

	(Henderson-Sellers & Serour, 2005)	"Agility refers to readiness for action or change; it has two dimensions: (1) the ability to adapt to various changes and (2) the ability to fine-tune and reengineer software development processes when needed"
	(Lyytinen & Rose, 2006)	"Agility is defined as the ability to sense and respond swiftly to technical changes and new business opportunities; it is enacted by exploration-based learning and exploitation-based learning"
	(Alistair Cockburn, 2007)	"Agility is being light, barely sufficient, and maneuverable"
	(Qumer & Henderson-Sellers, 2008)	"Agility is a persistent behavior or ability of an entity that exhibits flexibility to accommodate expected or unexpected changes rapidly, follows the shortest time span, and uses economical, simple, and quality instruments in a dynamic environment; agility can be evaluated by flexibility, speed, leanness, learning, and responsiveness"
Team autonomy	(A. Cockburn & Highsmith, 2001)	"Agile teams are characterized by self-organization"
	(J Highsmith, 2002)	"Software teams should enable team decision-making"
	(Jim Highsmith, 2004)	"The agile development supports self-organization, self-discipline, and self management"
	(Larman, 2004)	"In Scrum, the team is empowered with the authority and resources to find their own way and solve their own problems"

	(Sharp & Robinson, 2004)	"Self-managing, self-organizing teams are essential for agile development culture, especially for XP"
	(K Beck, 1999)	"One of the XP principles is team responsibility and authority"
	(Balijepally, Nerur, & Mahapatra, 2007)	"Self-organizing teams are key for responsiveness and flexibility"
	(Chow & Cao, 2008)	"Self-organizing teamwork is found to increase system quality"
Team diversity	(MacCormack, Verganti, & Iansiti, 2001)	"Teams with greater amounts of broad experience are positively associated with project performance"
	(Jim Highsmith, 2004)	"Getting the right people with appropriate skills is critical"
	(K Beck, 1999)	"One of the XP principles is team diversity, which is enacted by the notion of "whole team""
	(Alistair Cockburn, 2007)	"Team diversity is desirable; heterogeneous teams outperform homogeneous teams"
	(Balijepally et al., 2007)	"Team diversity is key for agile development"

From the beginning of 1970, software production line uses analysis of requirements, design of architecture, code development, testing and releasing which is similar to the sequential production in manufacturing. This method called as the waterfall model, which is dominantly used by many firms and organizations, to develop software products like assembly line in manufacturing. Project activities are broken into sequential parts as analysis, design, coding, testing and releasing phases, which are main steps to produce software outcomes. Iteration and flexibility in agile methodologies are the main missing part of this methodology (Casteren, 2017). It works from analysis to release direction, which is hardly or costly to return back to previous steps by requirement change. The time between analysis and release steps might be long that the customer needs can be changed in the middle of the process. The revised analysis and the doing twice the rest of the processes increase the cost and time. In general, the output of the process is not satisfactory enough. Figure 21 shows the model of waterfall software development model (Casteren, 2017).

Figure 21: Waterfall Software Development Model adopted from (Casteren, 2017)



Organizational structures of software firms are specifically developed to execute the all waterfall steps properly which is mostly inefficient for the whole organization. Unlike tangible products, software production processes are not adequate to overcome the problems. For that reason, new approaches and practices are tried by a group of software developers. These techniques are categorized and named differently and used by different type of organizations. In 2001, a group of agile techniques and practices founders prepare Agile Manifesto, which is the main milestone in agility in software. Most of agile practitioners depend on Agile Manifesto. Principles in Agile Manifesto reshape the software development processes from waterfall to more adaptive, iterative (Houston, 2014). Lean software development is introduced to the software world as Japanese lean manufacturing rises in the world.

The first agile software development methods are crystal methodologies, dynamic software development methods(DSDM), feature driven development, lean software development, scrum and extreme programming which are the base of the Agile Manifesto and with the help of these methodologies organizations build capabilities to respond changes efficiently. All these agile software development approaches' main aim is to efficiently and effectively react to the changes in customer demand on the software production side (G. Lee & Xia, 2010).

Crystal methodologies originated inside IBM by investigating software development teams. The main aim is to create set of methods to make object oriented projects to be efficient. This method is different than the other agile methods which targets to manage the rapidly changing requirements. In this method, projects are being categorized into different colors. Project specifications like size, priority and criticality determines the color of the project where the methodology name comes from. Frequent delivery, close communication, reflective improvement, personal safety, focus, easy access to expert user and technical environment are the main properties of this method (Alistair Cockburn, 2004).

The other methodology is the Dynamic Software Development Method(DSDM) which is built in 1994 to create a project delivery method to serve to the businesses. The aim of this approach is to deliver business outcomes on time and on budget. DSDM captures all project lifecycle steps in its procedures.

DSDM framework is based on nine principles which are (Stapleton, 1999):

- “Active user involvement is imperative.”
- “DSDM teams must be empowered to make decisions.”
- “The focus is on frequent delivery of products.”
- “Fitness for business purpose is the essential criterion for acceptance of deliverables.”
- “Iterative and incremental development is necessary to converge on an accurate business solution.”
- “All changes during development are reversible.”
- “Requirements are baselined at a high level.”
- “Testing is integrated throughout the lifecycle.”
- “A collaborative and co-operative approach between all stakeholders is essential.”

DSDM method delivers products or modules within short times which is not possible in traditional software development methods (Dybå & Dingsøyr, 2008). It uses different tools like timebox which is use to achieve small time scales named as timebox (Stapleton, 1999).

The third methodology is the feature driven development. The main focus in this method is the business feature. The iterative nature of the Crystal and DSDM is also included in this model for each feature. The model starts with developing overall model. Afterwards all feature list identified by decomposing the whole model. When the feature list is prepared then the team plan them to design and build each feature (Dybå & Dingsøyr, 2008).

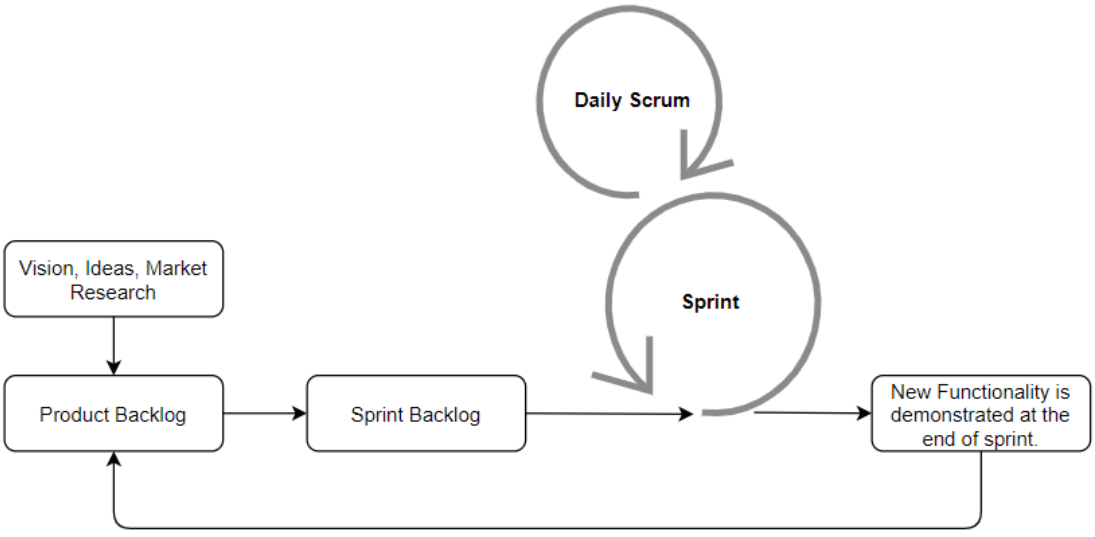
Lean software development is another method for software development. It’s basically implementation of lean manufacturing methods to the software development area. Lean methods initiated mainly in the manufacturing sectors. Lean implementations in the product development improve cost, quality, and production time. Using lean practices can do the same effects in software products. Lean product development has seven principles which are (Poppendieck, 2007):

- “Eliminate waste”
- “Increase learning”
- “Defer commitment”
- “Deliver fast”
- “Empower the team”
- “Build integrity”
- “See the big picture”

Scrum is another method that used as an agile method. It's a management approach for to use in complex software environments. In complex situations, central control and hierarchy is not enough. To control the complexity, independent teams and agents give decisions under predetermined rules. Teams and agents are working in a flat organizations to ensure that each team member can reach management level easily. Delegating decision making to the lower levels of the hierarchy is crucial when the project is complex enough. The core element in such agile teams are the feedback cycles in a self-organized team (Schwaber, 2004).

The cycles which are called sprints, are about planning and reviews. All the team members are attended in these two main activities to make the planning and reviews in a collaborative model. The team breakdowns the to-dos in a list as a backlog and in the planning session backlog items are planned by their priority. Product owner responsible for backlog prioritization. Backlog is the list of features which will be implemented by the team. Another role, scrum master is to work to solve problems inside the team when an inefficiency occurs. The maturity of the collaboration and activity practices makes the team self-organized (Poppendieck, 2007). New type of roles like product owner, scrum master appeared which are crucial to operate scrums. Figure 22 shows scrum process overview model (Schwaber, 2004).

Figure 22: Scrum Process overview adopted from (Schwaber, 2004)



The last agile method is the extreme programming, which have similar characteristics like the other agile methodologies. The main answer to the traditional software development is to create quality software, which is adaptive enough to the changing consumer requirements. Iterations and frequent software outputs involved with the customer and the team is the core of this method. It consists of twelve practices which are used to provide sustainable use of extreme programming. The planning game, frequent releases, metaphor, simple design, testing, refactoring, pair programming, collective ownership, continuous integration, 40-h week, on-site customers, and coding standards are the twelve practices. There are additional practices are built to support implementation of this method (K Beck, 1999; Poppendieck, 2007).

All different agile methods add various type of best practices and all of these feed the agile practitioners. Agile manifesto, which is prepared by a group of a practitioners in 2001, had a powerful effect on software development era. The whole agile software development methods are transformed to a new framework by remaining its core disciplines. Core disciplines of agile manifesto built on the essentials of the eXtreme programming (XP), scrum, lean software development, feature-driven development (FDD), and crystal methodologies which are detailed above. The collections of practices from various agile methodologies are turned into a "Manifesto for Agile Software Development" and generate practices within a new combination. There are four main values which are (Kent Beck et al., 2001):

- "Individuals and interactions over processes and tools"
- "Working software over comprehensive documentation"
- "Customer collaboration over contract negotiation"
- "Responding to change over following a plan"

The first value changes the privilege of processes over people. This first value aims to remove process constraints on the software development. In the second value focuses on leanness on documentation. It doesn't mean zero documentation, it refers to the documentation which includes only necessary information for the teams. All other unnecessary information can be removed from the documentation process. In the third value, customers are the main participant on the software development process which is actively shaped the software with the development them. The last value accepts the uncertainty is the part of the software development processes and responding to

change rather than a plan is crucial for a successful software project (Dingsøyr, Nerur, Balijepally, & Moe, 2012).

The all agile principles depend on simple design with quality software and generate business outcomes by releasing software in short time periods. All cycles not only supported by the development team but also customer or business units are also included into the processes. All agile methodologies from xtreme programming to scrum have mutual roots like interaction, communication and removing intermediary bridging roles-responsibilities. A dynamic planning and development with small iterations are remaining characteristics. Face to face communication within team and close customer relations are the main requirements of agile. Different agile approaches detailed in Table 11 (Casteren, 2017).

Table 11: Different Agile Approaches adopted from (G. Lee & Xia, 2010)

Agile Approach/ Method	Principles/Practices Emphasizing Software Development Agility	Principles/Practices Emphasizing Team Autonomy and Diversity
Agile Alliance Manifesto (K Beck et al., 2001)	• "Welcome changing requirements, even late in development" • "Agile processes promote sustainable development" •"Deliver working software frequently" •"Continuous attention to technical excellence enhances agility"	• "The best architectures, requirements, and designs emerge from self-organizing teams" •"Build projects around motivated individuals; give them the environment and support they need, and trust them to get the job done" • "Teams reflect on how to become more effective and adjust their behavior" • "Business people and developers must work together daily"

Scrum (Schwaber, 2004)	• "Software team determines features of each sprint from an evolving product backlog" •"Create an increment of potentially shippable software during each sprint"	• "Teams determine how much of the features in the product backlog they want to commit to during the next sprint" •"Self-organizing, cross-functional teams across different phases/sprints"
XP (K Beck, 1999)	• "The highest priority is continuously satisfy changing customer needs" • "Rapid user review and feedback"	•"Align team authority/control with responsibility to get things done" •"Pair programming: two developers complement each other's skills and work"
DSDM (Stapleton, 1999)	•"Development is iterative, incremental, and driven by user feedback" •"Delivering a perfect system is less important than delivering a system that addresses the current business needs"	•"Teams must be empowered to make project decisions without waiting for higher level approval" •"Continuous interactions and cooperation among all project stakeholders"
FDD (Coad, Lefebvre, De Luca, & Luca, 1999)	•"Customer/feature-centered iterative cycles" •"Regular build and inspection to ensure up-to date systems"	•"Small, dynamically formed, autonomous teams are effective " •"Multiple cross-functional minds are always applied to each design decision"

These agile principles realized in the operation by implementing a set of principles. The main practice is the self-organizing teams. The term self-organized team used to fulfill the traditional team structure. Different than traditional team structures there is no hierarchy inside the team. Every team member has equal cotributor in the team and each team member facilitates activities. The main argument to build self-organized team is to deliver more valuable assets regarding to traditional team organizations in a complex environment. They take their autonomy and decide

what to do and responsible for the outputs of the team by collaboration. All their decisions besides the customer interactions while running the sprints (Casteren, 2017).

A self-organized team mainly focuses on agile practices, face to face communication, colocated team members are the supportive instruments to the team activities. Finally, all these activities at the end, create motivated individuals which are ‘think outside of the box’. Maintaining motivated individuals with the support of management, mentors or coaches, are the main block to generate valuable outputs (S. Misra, Kumar, Kumar, Fantazy, & Akhter, 2012).

CHAPTER II: RESEARCH MODEL AND METHOD

2.1.Research Model

Rohrbeck provided details of the studies on the foreseeable future in his corporate foresight researches and stated the results in his researches. Perceiving, prospecting and probing dimensions cover the activities and practices to increase the organization's corporate foresight maturity. Practices and methods which are as a part of corporate foresight, will effect positively on corporate foresight maturity of organizations (Rohrbeck, 2011).

Especially in the world of VUCA, where change is intense, it can be important to study what can happen in the external environment in order to respond to the changes that will be in the organization (Baran & Woznyj, 2020). The sooner organizations can identify possible opportunities and threats and make preparations for these changes beforehand, they will be more prepared for the relevant effects on organization than their competitors. In this way, an appropriate and timely response will be given by the organization to the external world that is actually sensed (Overby et al., 2005).

Related to the prior information, organizational agility actually includes sensing the external environment and being able to respond quickly by adapting to the sensed informations. Therefore, the sense maturity of organizations that deal with the external environment in a structural way will increase, and response competence may increase according to the sensed information (Overby et al., 2005). With this perspective, organizational agility is supported with the sensing, seizing and transforming cycle specified by Teece in the dynamic capabilities theory (Teece et al., 2016).

In this direction, a quantitative research was conducted with survey about the effects of a technology-oriented foresight activity on corporate foresight and organizational agility maturity.

Hypothesis: Corporate foresight maturity and organizational agility sense dimension will be increased by implementing a technology based foresight activity inside the organization.

Research design provides information about methods used in the thesis. In Study 1, quantitative methods are used in the thesis to discover organizational agility inside a software company. In the research, a foresight activity is organized especially in the technology fields. The main aim of the

event is to increase the awereness of software development teams and management for technological advancements. Our proposal is, with the help of this activity sense dimension of the agility would be increased in the different attributes of foresight maturity model.

For that reason, a survey conducted inside the company to measure the initial position before the activity. After the technology activity completed, the same survey conducted after 3 months to measure the secondary position. The difference between the two survey results show the affects of foresight activity. The actual difference is crucial for the research about to learn about sense capability and absorptive capacity.

As a result, the goal of this research is to understand how foresight activity affects learning capability as absorptive capacity and sense capability in organizational agility framework.

2.2.Method

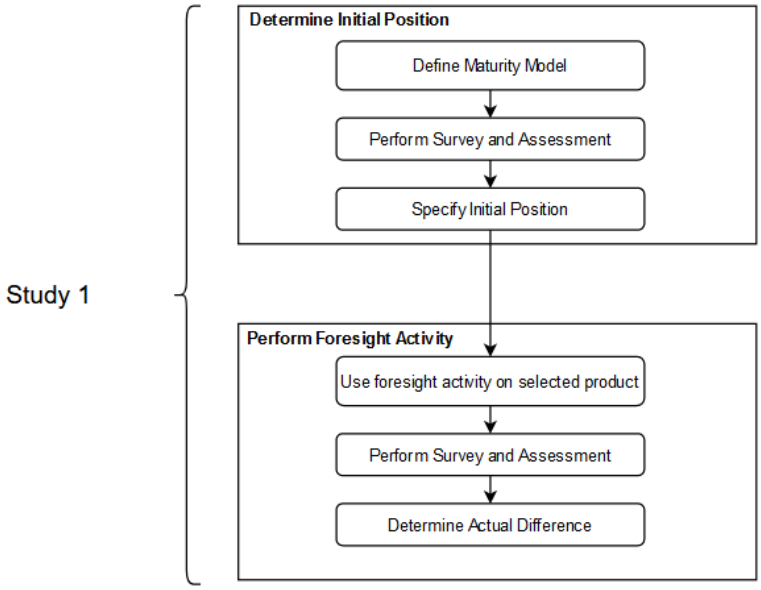
2.2.1. Procedure

Technology has been determined as the domain of the foresight activity. In the activity, technological developments in software domain that are expected to impact in the long-medium term were mentioned and the effects of these developments on the company were discussed. Afterwards, the use of this new technologies and roadmapping was carried out with participants from different teams and roles. The first half of this all-day event was moderated by experts in this technology. In the next half, roadmap work was carried out and the questions from the teams were discussed.

Consequently, the ultimate goal of this study is to understand how foresight activities affect organizational agility sense dimension, foresight maturity and absorptive capacity.

The research model of the thesis described in the Figure 23 diagram:

Figure 23: Study 1 research model



2.2.2. Sample

The research company was chosen because it tries to achieve organizational change in terms of agile transformation. Agile transformation directly affects both team setups, working practices and methods. In addition to software development area, there are also changes parallel to agile transformation in areas such as human resources and sales. In addition to this, it is an organization where future research and innovation activities are actively carried.

The foresight activity invitations were sent to more than 300 employees from the different teams. Total employee number of the company is nearly 1000. 300 employees are from different roles from director to software architect, product manager, manager and team member. 230 employees attended to the foresight activity from the invited group.

The first questionnaire was sent to approximately 350 employees(includes non-invited team members). This survey was sent to employees who participated in foresight activity and some team member which were not attended the foresight activity. 149 employees responded to the survey.

Respondents are from different teams and can have different roles. Survey respondents' role types is shown in the Table 12.

Table 12: Survey population and its numbers

Roles	Total
Architect	16
Manager	30
Product Manager	19
Team member	84
Grand Total	149

The software company is a subsidiary of a private bank, so most of the teams work for the bank's requirements. Some software development teams are work for external customers which have different team behaviours than the other teams. Some teams are hybrid which are both work for the bank and external customers. Table 13 shows the survey participants' team structure.

Table 13: Survey participants' team structure

Structure	Total
Bank	68
Hybrid	23
External	58
Grand Total	149

Survey respondents categorized into gender which is used in the statistical analysis. Table 14 shows survey participants' gender structure.

Table 14: Survey participants' gender structure

Gender	Total
M	95
F	54
Grand Total	149

Total of 107 employees were responded to the second survey. Architects, Product Managers and Managers are the main respondents of the second survey, which are also the respondents of the first survey. Table 15,16 and 17 show survey response details in different aspects.

Table 15: Survey question response details with roles and numbers

Roles	Total
Architect	9
Manager	28
Product Manager	11
Team member	59
Grand Total	107

Table 16: Survey question response details with gender

Gender	Total
M	65
F	42
Grand Total	107

Table 17: Survey question response details with structure

Structure	Total
Bank	46
Hybrid	27
Softtech	34
Grand Total	107

2.2.3. Measures

Understanding and measuring organizational agility inside the company is crucial for the research. For that reason literature search is done for the survey preparation and survey questions are formed by using these researches. The questions are formed to use for the research and controlled for appropriate use.

The survey is divided into eight parts, where all questions are likert scale questions with scale 1 to 5 except one open-ended question. Interval type data used in quantitative questions which are use for statistical analysis especially for testing of different means. Survey questions includes 44 questions which are categorized into two main categories as absorptive capacity and foresight maturity framework. These two main categories divided into eight sub-categories which are detailed in Table 18.

Table 18: Quantitative survey question categories and number of question in each category

Theory/Model	Categories	Number of Questions
Absorptive Capacity	Potential absorptive capacity (PAC)	4
Absorptive Capacity	Realised absorptive capacity (RAC)	4
Foresight Maturity Model	Culture	4
Foresight Maturity Model	Information Usage	8
Foresight Maturity Model	Method Sophistication	5
Foresight Maturity Model	Network	4
Foresight Maturity Model	Organization	12
Foresight Maturity Model	People	3
	Grand Total	44

Since the thesis is focused on organizational agility in sense dimension, it was possible to use survey questions about corporate foresight are prepared from the research paper of Rohrbeck(Rohrbeck & Kum, 2018). Absorptive capacity survey questions are prepared from the paper of Jung-Chieh Lee et al(J. C. Lee, Chen, & Shiue, 2017). These questions are adopted and used for measuring sense dimension in the corporate foresight maturity model and absorptive capacity.

These questions are adopted to use for different roles in the research and translated into Turkish language. Survey questions are prepared for product managers and product architects which are detailed in Table 19.

Table 19: Survey questions in Turkish and English for product managers and architects adopted from (Rohrbeck & Kum, 2018).

Category	Questions	Sorular
Potential absorptive capacity (PAC)	"We are able to identify and acquire internal and external knowledge"	Şirket içi ve dışı bilgileri belirleyebilir ve edinebiliriz.
Information Usage	"We are scanning current and adjacent businesses, as well as in unrelated areas."	Mevcut ve yakın iş alanlarıyla beraber alakasız iş alanlarında da inceleme yapmaktayız.
Information Usage	"We are scanning the technological environment."	Çevremizdeki(Şirket dışındaki) teknolojik değişimleri incelemekteyiz.
Information Usage	"We are scanning the political environment."	Çevremizdeki(Şirket dışındaki) politik değişimleri incelemekteyiz.
Information Usage	"We are scanning the economic environment."	Çevremizdeki(Şirket dışındaki) ekonomik değişimleri incelemekteyiz.
Information Usage	"We are scanning the socio-cultural environment."	Çevremizdeki(Şirket dışındaki) sosyo-kültürel değişimleri incelemekteyiz.
Information Usage	"We are proactively scanning in both the long and medium term."	Orta ve uzun vadede proaktif olarak çevre incelemesi yapmaktayız.
Information Usage	"We use a large variety of sources."	Çalışmalarımız için birçok farklı veri kaynağı kullanmaktayız.
Information Usage	"We are using restricted or exclusive sources, such as personal contacts which yield a competitive advantage."	Çalışmalarımız için özel kaynaklar kullanmaktayız(rekabet avantajı için kişisel kontaklar ve özel veritabanları).
Potential absorptive capacity (PAC)	"We have routines to identify, value, and import new information and knowledge."	Yeni bilgiyi tanımlamak, bilgiyi değerlendirme ve bu bilgiyi kullanmak için rutinlerimiz bulunmaktadır.

Potential absorptive capacity (PAC)	"We have adequate routines to analyse the information and knowledge obtained."	Farklı şekillerde elde edilen bilgi ve bilgi birikimini analiz etmek için yeterli rutinlere sahibiz.
Potential absorptive capacity (PAC)	"We have adequate routines to assimilate new information and knowledge."	Yeni bilgi ve anlamı özümsemek için yeterli rutinlerimiz vardır.
Method Sophistication	"We use methods that allow integrating market and technology perspectives as well as different time horizons."	Farklı zaman dilimlerinin yanı sıra pazar ve teknoloji perspektiflerini entegre etmeyi sağlayan yöntemler kullanıyoruz.
Method Sophistication	"We use methods that strongly support internal communication."	Güçlü bir iç iletişimi destekleyecek metodlar kullanmaktayız.
Method Sophistication	"We use methods that strongly support external communication."	Güçlü bir dış iletişimi destekleyecek metodlar kullanmaktayız.
Method Sophistication	"We select each of our foresight methods to solve a specific problem."	Geleceğe yönelik araştırma metodlarını belirli problemleri çözmek için kullanmaktayız.
Method Sophistication	"Our methods have been chosen to reflect the specific context of our company (e.g., volatility of the environment)."	Şirket içerisinde kullanılan yöntemler belirli içerikleri yansıtacak şekilde belirlenmektedir.
Realised absorptive capacity (RAC)	"We can successfully integrate our existing information into new knowledge."	Mevcut bilgilerimizi yeni bilgilerle başarıyla entegre edebiliriz.
Realised absorptive capacity (RAC)	"We are effective in transforming existing information into new knowledge."	Mevcut bilgi parçalarını yeni bir bilgi bütününe dönüştürmede etkiliyiz

Realised absorptive capacity (RAC)	"We can successfully exploit internal and external information and knowledge into concrete applications."	İç-dış bilgi ve bilgi birikimini somut uygulamalarda başarıyla kullanırız.
Realised absorptive capacity (RAC)	"We are effective in utilising knowledge into new product or services."	Bilgiyi yeni ürün veya hizmetlerde kullanma konusunda etkiliyiz.
People	"Foresighters in our company have a broad knowledge reaching beyond their own domain."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar, kendi alanlarının ötesine uzanan geniş bir bilgiye sahiptir.
People	"Foresighters in our company have a strong internal network."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir iç ağa sahiptir.
People	"Foresighters in our company have a strong external network."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir dış ağa sahiptir.
Network	"Foresight insights are rapidly diffused throughout the company."	Geleceğe yönelik öngörüler şirket genelinde hızla yayılmaktadır.
Network	"Foresight insights are diffused mostly in a formal manner."	Geleceğe yönelik öngörüler çoğunlukla resmi bir şekilde yayılır.
Network	"Foresight insights are diffused mostly in an informal manner."	Geleceğe yönelik öngörüler çoğunlukla gayri resmi bir şekilde yayılır.
Network	"What are the main obstacles faced by foresighters in your company?"	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanların karşılaştığı başlıca engeller nelerdir?
Organization	"Our foresight activities are issue driven (i.e., directed by a specific question)."	Geleceğe yönelik araştırma faaliyetlerimiz, konuya yöneliktir (belirli bir soruya yönelik).

Organization	“There are continuous foresight activities in place (e.g., scanning for emerging technologies with disruptive potential).”	Sürekli geleceğe yönelik öngörü faaliyetleri mevcuttur (örneğin, yıkıcı potansiyeli olan yeni teknolojilerin taranması).
Organization	“Our foresight activities are triggered top-down (e.g., by top management).”	Geleceğe yönelik öngörü faaliyetlerimiz tepeden aşağıya doğru tetiklenir (örneğin, üst yönetim tarafından).
Organization	“Our foresight activities are triggered bottom-up.”	Geleceğe yönelik öngörü faaliyetlerimiz aşağıdan yukarıya doğru tetiklenir.
Organization	“Our foresight activities are linked to corporate development.”	Geleceğe yönelik öngörü faaliyetlerimiz kurumsal gelişim ile bağlantılıdır.
Organization	“Our foresight activities are linked to strategic management.”	Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır.
Organization	“Our foresight activities are linked to innovation management.”	Geleceğe yönelik öngörü faaliyetlerimiz inovasyon yönetimi ile bağlantılıdır.
Organization	“Our foresight activities are linked to R&D.”	Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır.
Organization	“Our foresight activities are linked to strategic controlling.”	Geleceğe yönelik öngörü faaliyetlerimiz stratejik kontrol ile bağlantılıdır.
Organization	“Our foresight activities are linked to marketing.”	Geleceğe yönelik öngörü faaliyetlerimiz pazarlama ile bağlantılıdır.
Organization	“In our company every employee is responsible for detecting weak signals.”	Şirketimizde çevredeki zayıf sinyallerin(weak signals) tespitinden her çalışan sorumludur.
Organization	“There are incentives in place that reward scanning for change.”	Değişimle ilgili çevreyi incelemeyi ödüllendiren teşvikler bulunmaktadır.

Culture	"In our company, information is shared freely across functions and hierarchical levels."	Şirketimizde, bilgi ekipler ve farklı kademelerde serbestçe paylaşılmaktadır.
Culture	"Our company encourages building and maintaining an external network."	Şirketimiz harici bir ağ kurmayı ve sürdürmeyi teşvik eder.
Culture	"Most people in our company are actively scanning the periphery."	Şirketimizdeki çoğu insan aktif olarak çevreyi taramaktadır.
Culture	"Basic assumptions are explicitly and frequently challenged."	Çalışılan konulara ilişkin temel varsayımlar açıkça ve sıklıkla sorgulanmaktadır.

Survey questions are prepared for managers and team members which are detailed in Table 20:

Table 20: Survey questions in Turkish and English for managers and team members adopted from (Rohrbeck & Kum, 2018).

Category	Questions	Sorular
Potential absorptive capacity (PAC)	"Our company is able to identify and acquire internal and external knowledge."	Şirket içi ve dışı bilgileri belirleyebilir ve edinebiliriz.
Information Usage	"Our company is scanning current and adjacent businesses, as well as in unrelated areas."	Şirketimiz mevcut ve yakın iş alanlarıyla beraber alakasız iş alanlarında da inceleme yapmaktadır.
Information Usage	"Our company is scanning the technological environment."	Şirketimiz çevresindeki teknolojik değişimleri incelemektedir.

Information Usage	"Our company is scanning the political environment."	Şirketimiz çevresindeki politik değişimleri incelemektedir.
Information Usage	"Our company is scanning the economic environment."	Şirketimiz çevresindeki ekonomik değişimleri incelemektedir.
Information Usage	"Our company is scanning the socio-cultural environment."	Şirketimiz çevresindeki sosyo-kültürel değişimleri incelemektedir.
Information Usage	"Our company is proactively scanning in both the long and medium term."	Şirketimiz orta ve uzun vadede proaktif olarak çevre incelemesi yapmaktadır.
Information Usage	"Our company uses a large variety of sources."	Şirketimiz çalışmalar için birçok farklı veri kaynağı kullanmaktayız.
Information Usage	"Our company is using restricted or exclusive sources, such as personal contacts which yield a competitive advantage."	Şirketimiz çalışmalar için özel kaynaklar kullanmaktadır(rekabet avantajı için kişisel kontaklar ve özel veritabanları).
Potential absorptive capacity (PAC)	"Our company has routines to identify, value, and import new information and knowledge."	Şirketimizin yeni bilgiyi tanımlamak, bilgiyi değerlendirmek ve bu bilgiyi kullanmak için rutinleri bulunmaktadır.
Potential absorptive capacity (PAC)	"Our company has adequate routines to analyse the information and knowledge obtained."	Şirketimizin farklı şekillerde elde edilen bilgi ve bilgi birikimini analiz etmek için yeterli rutinleri bulunmaktadır.
Potential absorptive capacity (PAC)	"Our company has adequate routines to assimilate new information and knowledge."	Şirketimizin yeni bilgi ve anlamı özümsemek için yeterli rutinleri vardır.

Method Sophisticatio n	“Our company uses methods that allow integrating market and technology perspectives as well as different time horizons.”	Şirketimiz farklı zaman dilimlerinin yanı sıra pazar ve teknoloji perspektiflerini entegre etmeyi sağlayan yöntemler kullanmaktadır.
Method Sophisticatio n	“Our company uses methods that strongly support internal communication.”	Şirketimiz güçlü bir iç iletişimi destekleyecek metodlar kullanmaktadır.
Method Sophisticatio n	“Our company uses methods that strongly support external communication.”	Şirketimiz güçlü bir dış iletişimi destekleyecek metodlar kullanmaktadır.
Method Sophisticatio n	“Our company selects each of our foresight methods to solve a specific problem.”	Şirketimiz geleceğe yönelik araştırma metodlarını belirli problemleri çözmek için kullanmaktadır.
Method Sophisticatio n	“Company's methods have been chosen to reflect the specific context of our company (e.g., volatility of the environment).”	Şirketimiz içerisinde kullanılan yöntemler belirli içerikleri yansıtacak şekilde belirlenmektedir.
Realised absorptive capacity (RAC)	“Our company can successfully integrate our existing information into new knowledge.”	Şirketimiz mevcut bilgilerimizi yeni bilgilerle başarıyla entegre edebilir.
Realised absorptive capacity (RAC)	“Our company is effective in transforming existing information into new knowledge.”	Şirketimiz mevcut bilgi parçalarını yeni bir bilgi bütününe dönüştürmede etkilidir.
Realised absorptive capacity (RAC)	“Our company can successfully exploit internal and external information and knowledge into concrete applications.”	Şirketimiz iç-dış bilgi ve bilgi birikimini somut uygulamalarda başarıyla kullanabilir.

Realised absorptive capacity (RAC)	"Our company is effective in utilising knowledge into new product or services."	Şirketimiz bilgiyi yeni ürün veya hizmetlerde kullanma konusunda etkilidir.
People	"Foresighters in our company have a broad knowledge reaching beyond their own domain."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar, kendi alanlarının ötesine uzanan geniş bir bilgiye sahiptir.
People	"Foresighters in our company have a strong internal network."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir iç ağa sahiptir.
People	"Foresighters in our company have a strong external network."	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir dış ağa sahiptir.
Network	"Foresight insights are rapidly diffused throughout the company."	Geleceğe yönelik öngörüler şirket genelinde hızla yayılmaktadır.
Network	"Foresight insights are diffused mostly in a formal manner."	Geleceğe yönelik öngörüler çoğunlukla resmi bir şekilde yayılır.
Network	"Foresight insights are diffused mostly in an informal manner."	Geleceğe yönelik öngörüler çoğunlukla gayri resmi bir şekilde yayılır.
Network	"What are the main obstacles faced by foresighters in your company?"	Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanların karşılaştığı başlıca engeller nelerdir?
Organization	"Our foresight activities are issue driven (i.e., directed by a specific question)."	Geleceğe yönelik araştırma faaliyetlerimiz, konuya yöneliktir (belirli bir soruya yönelik).
Organization	"There are continuous foresight activities in place (e.g., scanning for	Sürekli geleceğe yönelik öngörü faaliyetleri mevcuttur (örneğin,

	emerging technologies with disruptive potential).”	yıkıcı potansiyeli olan yeni teknolojilerin taranması).
Organization	“Our foresight activities are triggered top-down (e.g., by top management).”	Geleceğe yönelik öngörü faaliyetlerimiz tepeden aşağıya doğru tetiklenir (örneğin, üst yönetim tarafından).
Organization	“Our foresight activities are triggered bottom-up.”	Geleceğe yönelik öngörü faaliyetlerimiz aşağıdan yukarıya doğru tetikleniyor.
Organization	“Our foresight activities are linked to corporate development.”	Geleceğe yönelik öngörü faaliyetlerimiz kurumsal gelişim ile bağlantılıdır.
Organization	“Our foresight activities are linked to strategic management.”	Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır.
Organization	“Our foresight activities are linked to innovation management.”	Geleceğe yönelik öngörü faaliyetlerimiz inovasyon yönetimi ile bağlantılıdır.
Organization	“Our foresight activities are linked to R&D.”	Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır.
Organization	“Our foresight activities are linked to strategic controlling.”	Geleceğe yönelik öngörü faaliyetlerimiz stratejik kontrol ile bağlantılıdır.
Organization	“Our foresight activities are linked to marketing.”	Geleceğe yönelik öngörü faaliyetlerimiz pazarlama ile bağlantılıdır.
Organization	“In our company every employee is responsible for detecting weak signals.”	Şirketimizde çevredeki zayıf sinyallerin(weak signals) tespitinden her çalışan sorumludur.

Organization	"There are incentives in place that reward scanning for change."	Değişimle ilgili çevreyi incelemeyi ödüllendiren teşvikler bulunmaktadır.
Culture	"In our company, information is shared freely across functions and hierarchical levels."	Şirketimizde, bilgi ekipler ve farklı kademelerde serbestçe paylaşılmaktadır.
Culture	"Our company encourages building and maintaining an external network.	Şirketimiz harici bir ağ kurmayı ve sürdürmeyi teşvik eder.
Culture	"Most people in our company are actively scanning the periphery."	Şirketimizdeki çoğu insan aktif olarak çevreyi taramaktadır.
Culture	"Basic assumptions are explicitly and frequently challenged."	Çalışılan konulara ilişkin temel varsayımlar açıkça ve sıklıkla sorgulanmaktadır.

In the research, factor analysis is used to understand the relationships between the predefined factors and also without the predefined factors, new factors are calculated. Conventional 0,3 loading as a cut-off is used for factor inclusion decision.

Predictors. Survey questions adopted from Rohrbeck's research (Rohrbeck & Kum, 2018) and 5 point Likert-type scale ranging from 1(never) to 5(always). In the Principal Component Analysis KMO test scored as 0,821 and 9 factors appeared in the first factor analysis. After this analysis factor numbers limited to 6 as in the predefined factors and KMO test scored as 0,821. Variance of factors is 52,6%. Factor test repeated till there is no unrelated item in the factors. The last result detailed in the analysis section.

A second analysis done on the survey date as confirmatory factor analysis. In confirmatory factor analysis item estimates should be 0,7. Estimates lower than this limit removed from the analysis and factors with result items concluded in the analysis.

2.2.4. Data Analysis

Survey responses were gathered and processed to measure the effects of foresight effect on organizational agility. The statistical analysis done by comparing two survey results in each category and sub-category to determine if there is a difference between the two survey responses.

In statistical analysis, by usage of the test hypothesis, the hope is to be able to answer the research hypothesis.

The selected statistical tests used are T-Tests. IBM SPSS tool is used for statistical computing. Confirmatory factor analysis is implemented on the two survey results. IBM AMOS tool is used for confirmatory factor analysis.

CHAPTER III: ANALYSIS

3.1.1. First Survey Results

Statistical analysis are performed on the survey data. The first analysis is the correlation and confirmatory factor analysis(CFA) on both the foresight and absorptive capacity factors.

In the CFA analysis lower estimates are removed from the analysis and the final estimates are listed as below. These estimates are classified in new factors and analysis done on these new factors.Table 21 shows factors after confirmatory factor analysis and Table 22 shows CFA result table on foresight factors.

Table 21: Factors after Confirmatory Factor Analysis

POF	Potential Absorptive Capacity Factor	
ROF	Realized Absorptive Capacity Factor	
AF1	CFA Factor 1	IU(B,C,D)
AF2	CFA Factor 2	C(A,B,C)
AF3	CFA Factor 3	MS(B,C,D)
AF4	CFA Factor 4	P(Null,A,B)
AF5	CFA Factor 5	O(D,E,F,G,H)
AF6	CFA Factor 6	N

Table 22: CFA result table on foresight factors

Factors	Factor Items	Estimate
Information Usage	IU_D	0,724
Information Usage	IU_C	0,825
Information Usage	IU_B	0,790
Culture	C_A	0,694
Culture	C_B	0,719
Culture	C_C	0,623
Method Sophistication	MS_D	0,601
Method Sophistication	MS_C	0,678
Method Sophistication	MS_B	0,586
People	P_B	0,832
People	P_A	0,763
People	P	0,816
Organization	O_D	0,580
Organization	O_E	0,667
Organization	O_F	0,861
Organization	O_G	0,770
Organization	O_H	0,588

Correlation analysis done on the SPSS using new factos. Correlation between foresight factors and absorptive capacity correlation coefficients are high which shows that all factors are strongly related to each other. Table 23 shows foresight and absorptive capacity correlation matrix details.

Table 23: Foresight and absorptive capacity correlation matrix

Correlations

			POF	ROF	AF1	AF2	AF3	AF4	AF5	AF6
Spearman's rho	POF	Correlation Coefficient	1,000	,391**	,287**	,435**	,640**	,457**	,329**	,364**
		Sig. (2-tailed)	.	,000	,000	,000	,000	,000	,000	,000
		N	148	148	148	148	148	148	148	148
	ROF	Correlation Coefficient	,391**	1,000	,242**	,334**	,381**	,267**	,298**	,271**
		Sig. (2-tailed)	,000	.	,003	,000	,000	,001	,000	,001
		N	148	148	148	148	148	148	148	148
	AF1	Correlation Coefficient	,287**	,242**	1,000	,395**	,253**	,217**	,255**	,192*
		Sig. (2-tailed)	,000	,003	.	,000	,002	,008	,002	,019
		N	148	148	148	148	148	148	148	148
	AF2	Correlation Coefficient	,435**	,334**	,395**	1,000	,492**	,417**	,448**	,482**
		Sig. (2-tailed)	,000	,000	,000	.	,000	,000	,000	,000
		N	148	148	148	148	148	148	148	148
	AF3	Correlation Coefficient	,640**	,381**	,253**	,492**	1,000	,408**	,432**	,398**
		Sig. (2-tailed)	,000	,000	,002	,000	.	,000	,000	,000
		N	148	148	148	148	148	148	148	148
	AF4	Correlation Coefficient	,457**	,267**	,217**	,417**	,408**	1,000	,324**	,570**
		Sig. (2-tailed)	,000	,001	,008	,000	,000	.	,000	,000
		N	148	148	148	148	148	148	148	148
	AF5	Correlation Coefficient	,329**	,298**	,255**	,448**	,432**	,324**	1,000	,366**
		Sig. (2-tailed)	,000	,000	,002	,000	,000	,000	.	,000
		N	148	148	148	148	148	148	148	148
	AF6	Correlation Coefficient	,364**	,271**	,192*	,482**	,398**	,570**	,366**	1,000
		Sig. (2-tailed)	,000	,001	,019	,000	,000	,000	,000	.
		N	148	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Statistical tests to find significance on factors, done on the factor data. Statistical tests used in the analysis are; T-test for Gender, Meeting Attendance, Manager/Non-manager properties and ANOVA for Role and Team Structure.

As a result of T-test there is statistical significance between meeting attendants and non-attendants in Factor 3. Factor 3 includes Method Sophistication items. Table 24 shows T-test results for meeting attendents and non attendants.

Table 24: T-test for meeting attendents and non attendants.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AF1	Equal variances assumed	3,935	,049	-,374	146	,709	-,04623	,12366	-,29063	,19817
	Equal variances not assumed			-,380	144,749	,705	-,04623	,12177	-,28691	,19445
AF2	Equal variances assumed	,001	,975	-1,875	146	,063	-,22406	,11950	-,46023	,01211
	Equal variances not assumed			-1,877	143,931	,063	-,22406	,11936	-,45999	,01188
AF3	Equal variances assumed	9,463	,003	-3,105	146	,002	-,32330	,10413	-,52910	-,11750
	Equal variances not assumed			-3,188	136,742	,002	-,32330	,10143	-,52387	-,12274
AF4	Equal variances assumed	1,075	,302	,618	146	,537	,07870	,12731	-,17291	,33031
	Equal variances not assumed			,620	144,714	,536	,07870	,12695	-,17221	,32961
AF5	Equal variances assumed	1,352	,247	-,770	146	,443	-,07349	,09550	-,26223	,11525
	Equal variances not assumed			-,775	145,761	,440	-,07349	,09488	-,26101	,11403
AF6	Equal variances assumed	,130	,719	-,837	146	,404	-,12713	,15193	-,42740	,17314
	Equal variances not assumed			-,840	144,971	,402	-,12713	,15140	-,42636	,17209

Another result of T-test is, the statistical significance between managers and non-managers in Factor 3. Factor 3 includes Method Sophistication items. Table 25 shows T-test results for managers and non managers.

Table 25: T-test for managers and non managers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AF1	Equal variances assumed	,123	,726	-,240	146	,810	-,03691	,15350	-,34027	,26645
	Equal variances not assumed			-,245	46,048	,807	-,03691	,15050	-,33984	,26601
AF2	Equal variances assumed	,018	,893	,601	146	,549	,09002	,14988	-,20619	,38622
	Equal variances not assumed			,612	45,981	,544	,09002	,14711	-,20610	,38614
AF3	Equal variances assumed	1,642	,202	2,414	146	,017	,31582	,13083	,05726	,57438
	Equal variances not assumed			2,867	58,527	,006	,31582	,11014	,09538	,53625
AF4	Equal variances assumed	2,120	,148	-,602	146	,548	-,09510	,15799	-,40735	,21714
	Equal variances not assumed			-,697	55,925	,488	-,09510	,13638	-,36831	,17811
AF5	Equal variances assumed	,071	,790	,479	146	,633	,05684	,11865	-,17766	,29133
	Equal variances not assumed			,454	42,146	,652	,05684	,12523	-,19586	,30953
AF6	Equal variances assumed	,256	,614	,200	146	,842	,03785	,18896	-,33559	,41130
	Equal variances not assumed			,210	47,695	,835	,03785	,18050	-,32513	,40084

In SPSS Principal Component Analysis, survey data is forced to 6 factors to ensure the data validity in the factors which are detailed in Table 26. As a result of this factors are structured as:

- Network and Culture are combined
- Organization divided into two factors
- Some items in the factors are removed due to low variance

Table 26: Pattern matrix for Principal Component Analysis

Pattern Matrix[a]

		Component					
		1	2	3	4	5	6
Factor 1	P-Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar, kendi alanlarının ötesine uzanan geniş bir bilgiye sahiptir.	,891					
Factor 1	P-Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir dış ağa sahiptir.	,868					
Factor 1	P-Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanlar güçlü bir iç ağa sahiptir.	,815					
Factor 1	N-Geleceğe yönelik öngörüler şirket genelinde hızla yayılmaktadır.	,583					
Factor 2	IU-Şirketimiz çevresindeki ekonomik değişimleri incelemektedir.		,860				

Factor 2	IU-Şirketimiz çevresindeki sosyo-kültürel değişimleri incelemektedir.		,842				
Factor 2	IU-Şirketimiz çevresindeki politik değişimleri incelemektedir.		,841				
Factor 3	IU-Şirketimiz çalışmalar için özel kaynaklar kullanmaktadır(rekabet avantajı için kişisel kontaklar ve özel veritabanları).			,742			
Factor 3	IU-Şirketimiz mevcut ve yakın iş alanlarıyla beraber alakasız iş alanlarında da inceleme yapmaktadır.			,701			
Factor 3	MS-Şirketimiz farklı zaman dilimlerinin yanı sıra pazar ve teknoloji perspektiflerini entegre etmeyi sağlayan yöntemler kullanmaktadır.			,553			
Factor 3	MS-Şirketimiz güçlü bir dış iletişimi destekleyecek metodlar kullanmaktadır.			,539			
Factor 4	N-Geleceğe yönelik öngörüler çoğunlukla gayri resmi bir şekilde yayılır.				,928		

Factor 4	N-Geleceğe yönelik öngörüler çoğunlukla resmi bir şekilde yayılır.				-,783		
Factor 4	C-Çalışılan konulara ilişkin temel varsayımlar açıkça ve sıklıkla sorgulanmaktadır.				-,446		
Factor 5	O-Geleceğe yönelik öngörü faaliyetlerimiz inovasyon yönetimi ile bağlantılıdır.					,797	
Factor 5	O-Geleceğe yönelik öngörü faaliyetlerimiz stratejik kontrol ile bağlantılıdır.					,783	
Factor 5	O-Geleceğe yönelik öngörü faaliyetlerimiz kurumsal gelişim ile bağlantılıdır.					,680	
Factor 6	O-Değişimle ilgili çevreyi incelemeyi ödüllendiren teşvikler bulunmaktadır.						,791
Factor 6	O-Geleceğe yönelik öngörü faaliyetlerimiz aşağıdan yukarıya doğru tetikleniyor.						,585
Factor 6	C-Şirketimiz harici bir ağ kurmayı ve sürdürmeyi teşvik eder.						,556

Correlation between foresight factors and absorptive capacity correlation coefficients are high which shows that all factors are strongly related to each other which are detailed in Table 27.

Table 27: Correlation matrix of absorptive capacity and foresight factors

Correlations

			F1	F2	F3	F4	F5	F6	POF	ROF
Spearman's rho	F1	Correlation Coefficient	1,000	,230**	,280**	,375**	,346**	,387**	,463**	,287**
		Sig. (2-tailed)	.	,005	,001	,000	,000	,000	,000	,000
		N	148	148	148	148	148	148	148	148
	F2	Correlation Coefficient	,230**	1,000	,203*	,290**	,274**	,269**	,287**	,242**
		Sig. (2-tailed)	,005	.	,014	,000	,001	,001	,000	,003
		N	148	148	148	148	148	148	148	148
	F3	Correlation Coefficient	,280**	,203*	1,000	,249**	,218**	,204*	,483**	,287**
		Sig. (2-tailed)	,001	,014	.	,002	,008	,013	,000	,000
		N	148	148	148	148	148	148	148	148
	F4	Correlation Coefficient	,375**	,290**	,249**	1,000	,276**	,226**	,391**	,352**
		Sig. (2-tailed)	,000	,000	,002	.	,001	,006	,000	,000
		N	148	148	148	148	148	148	148	148
	F5	Correlation Coefficient	,346**	,274**	,218**	,276**	1,000	,338**	,298**	,253**
		Sig. (2-tailed)	,000	,001	,008	,001	.	,000	,000	,002
		N	148	148	148	148	148	148	148	148
	F6	Correlation Coefficient	,387**	,269**	,204*	,226**	,338**	1,000	,299**	,177*
		Sig. (2-tailed)	,000	,001	,013	,006	,000	.	,000	,031
		N	148	148	148	148	148	148	148	148
	POF	Correlation Coefficient	,463**	,287**	,483**	,391**	,298**	,299**	1,000	,391**
		Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	.	,000
		N	148	148	148	148	148	148	148	148
	ROF	Correlation Coefficient	,287**	,242**	,287**	,352**	,253**	,177*	,391**	1,000
		Sig. (2-tailed)	,000	,003	,000	,000	,002	,031	,000	.
		N	148	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Same statistical tests done on the factor data which includes T-test for Gender, Meeting Attendance, Manager/Non-manager and ANOVA for Role and Team Structure.

As a result of T-test there is statistical significance between managers and non-managers in Factor 3 which detailed in Table 28. Factor 3 includes both Information Usage and Method Sophistication items.

Table 28: T-test result of managers and non managers

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
F1	Equal variances assumed	3,758	,054	-,409	146	,683	-,06186	,15138	-,36105	,23732
	Equal variances not assumed			-,476	56,393	,636	-,06186	,13006	-,32237	,19864
F2	Equal variances assumed	,123	,726	-,240	146	,810	-,03691	,15350	-,34027	,26645
	Equal variances not assumed			-,245	46,048	,807	-,03691	,15050	-,33984	,26601
F3	Equal variances assumed	2,262	,135	2,719	146	,007	,34562	,12713	,09437	,59688
	Equal variances not assumed			3,117	54,939	,003	,34562	,11087	,12344	,56781
F4	Equal variances assumed	,003	,959	,366	146	,715	,03183	,08707	-,14026	,20391
	Equal variances not assumed			,361	44,202	,720	,03183	,08819	-,14588	,20954
F5	Equal variances assumed	,043	,836	,688	146	,493	,08192	,11911	-,15348	,31732
	Equal variances not assumed			,663	42,989	,511	,08192	,12351	-,16717	,33101
F6	Equal variances assumed	,001	,982	1,482	146	,141	,20847	,14069	-,06958	,48653
	Equal variances not assumed			1,483	44,964	,145	,20847	,14053	-,07458	,49153

Confirmatory factor analysis and principal factor analysis results in the six factors are similar to each other. In the final analysis result, all factors are correlated to each other. Foresight factors and absorptive capacity factors are also correlated to each other in the correlation analysis.

Statistical tests show us information about the significances in different aspects like gender, structure, role, meeting attendance and manager/non-manager. There is statistical significance on Factor 3 in the aspect of meeting attendance and managers/non-managers.

In the second survey, the same audience used to measure the effect of the foresight activity. The gap between the two surveys and the other statistical analysis are reported to show the results of the foresight activity effects on agility.

3.1.2. Second Survey Results

There is one open ended question in the survey which are shown in Table 29. Some survey respondents didn't answer this question. All answers coded to categories and categories are shown in Table 30.

Table 29: Open ended question details

Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanların karşılaştığı başlıca engeller nelerdir?
What are the main obstacles faced by foresighters in your company?

Table 30: Open ended question results from the two surveys

Reasons	Total Number (Survey 1)	Percantage (Survey 1)	Total Number (Survey 2)	Percentage (Survey 2)
Time	50	44,2	32	34,4
Management	29	25,7	16	17,2
Resource	9	8	20	21,5
Resistance	4	3,5	3	3,2
Support	1	0,9	5	5,4
Other	20	17,7	17	18,3
Grand Total	113	100	93	100

Statistical analysis is performed on between the first and second survey data which are shown in Table 31. There are a statistical significance in the survey results which are shown in the below table.

Table 31: Statistical test result on the second survey questions.

	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	Paired Differences	t	df	Sig. (2-tailed)
Pair 33	ORG60-Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır. - ORG61-Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır.	,290	,922	,089	,113	,466	3,252	106	,002
Pair 35	ORG80-Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile	,215	1,108	,107	,003	,427	2,007	106	,047

	bağlantılıdır. - ORG81- Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır.								

There is no statistical significance in 6 Factors(Foresight) and 2 Absorptive Capacity Factors between two surveys which are shown in Table 32.

Table 32: Statistical test result on the standard factors.

Paired Samples Test					
		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	PAC1 - PAC2	,18721	,616	106	,539
Pair 2	IU1 - IU2	,10326	-,219	106	,827
Pair 3	MS1 - MS2	,14142	,450	106	,654
Pair 4	RAC1 - RAC2	,16983	,280	106	,780
Pair 5	PEO1 - PEO2	,06506	-1,017	106	,311

Pair 6	NTW1 - NTW2	,04098	-1,241	106	,217
Pair 7	ORG1 - ORG2	,14159	,732	106	,466
Pair 8	CLT1 - CLT2	,10577	-,628	106	,531

Confirmatory Factor Analysis is done on the second survey data which shows the factors related to the participant answers in Table 33. CFA factors from first survey factors with first and second survey results are shown in Table 34.

Table 33: CFA result table on foresight factors

Factors	Factor Items	Estimate
Information Usage	IU_E	0,680
Information Usage	IU_D	0,764
Information Usage	IU_C	0,761
Method Sophistication	MS_C	0,793
Method Sophistication	MS_B	0,641
People	P_C	0,793
People	P_B	0,789
People	P_A	0,779
Organization	O_F	0,694
Organization	O_G	0,809
Organization	O_H	0,719
Organization	O_I	0,685
Culture	C_B	0,692
Culture	C_C	0,713
Culture	C_D	0,655

Table 34: CFA factors from first survey factors with first and second survey results

POF	Potential Absorptive Capacity Factor	
ROF	Realized Absorptive Capacity Factor	
AF11	CFA Factor 1 – Survey 1	IU(B,C,D)
AF21	CFA Factor 2 – Survey 1	C(A,B,C)
AF31	CFA Factor 3 – Survey 1	MS(B,C,D)
AF41	CFA Factor 4 – Survey 1	P(Null,A,B)
AF51	CFA Factor 5 – Survey 1	O(D,E,F,G,H)
AF61	CFA Factor 6 – Survey 1	N
AF12	CFA Factor 1 – Survey 2	IU(B,C,D)
AF22	CFA Factor 2 – Survey 2	C(A,B,C)
AF32	CFA Factor 3 – Survey 2	MS(B,C,D)
AF42	CFA Factor 4 – Survey 2	P(Null,A,B)
AF52	CFA Factor 5 – Survey 2	O(D,E,F,G,H)
AF62	CFA Factor 6 – Survey 2	N

First and Second survey CFA factors are statistically analyzed in SPSS and statistical significance find in organization factor in Table 35.

Table 35: First CFA factor comparison analysis

		t	df	Sig. (2-tailed)
Pair 1	AF11 - AF12	-,733	106	,465
Pair 2	AF21 - AF22	-1,017	106	,311
Pair 3	AF31 - AF32	,000	106	1,000
Pair 4	AF41 - AF42	-1,017	106	,311
Pair 5	AF51 - AF52	2,610	106	,010
Pair 6	AF61 - AF62	-,581	106	,562

Last CFA factors are analyzed in SPSS and statistical significance find in organization factor. Details are shown in Table 36 and 37.

Table 36: CFA factors from second survey factors with first and second survey results

POF	Potential Absorptive Capacity Factor	
ROF	Realized Absorptive Capacity Factor	
AF11	CFA Factor 1 – Survey 1	IU(C,D,E)
AF21	CFA Factor 2 – Survey 1	C(B,C,D)
AF31	CFA Factor 3 – Survey 1	MS(B,C)
AF41	CFA Factor 4 – Survey 1	P(A,B,C)
AF51	CFA Factor 5 – Survey 1	O(F,G,H,I)
AF61	CFA Factor 6 – Survey 1	N
AF12	CFA Factor 1 – Survey 2	IU(C,D,E)
AF22	CFA Factor 2 – Survey 2	C(B,C,D)

AF32	CFA Factor 3 – Survey 2	MS(B,C)
AF42	CFA Factor 4 – Survey 2	P(A,B,C)
AF52	CFA Factor 5 – Survey 2	O(F,G,H,I)
AF62	CFA Factor 6 – Survey 2	N

Table 37: Second CFA factor comparison analysis

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	AFN11 - AFN12	,10630	-,733	106	,465
Pair 2	AFN21 - AFN22	,07985	-1,017	106	,311
Pair 3	AFN31 - AFN32	,27827	1,536	106	,127
Pair 4	AFN41 - AFN42	,06506	-1,017	106	,311
Pair 5	AFN51 - AFN52	,34485	2,692	106	,008
Pair 6	AFN61 - AFN62	,13529	-,581	106	,562

Similar analysis done on the meeting attendant's data and statistical significance find in organization and method sophistication factors which are detailed in Table 38.

Table 38: Second CFA factor comparison analysis on meeting attendants.

		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	AFN11 - AFN12	,07501	-1,330	49	,190
Pair 2	AFN21 - AFN22	,08824	-1,295	49	,201
Pair 3	AFN31 - AFN32	,43127	2,093	49	,042
Pair 4	AFN41 - AFN42	,11382	-,829	49	,411
Pair 5	AFN51 - AFN52	,35988	2,011	49	,050
Pair 6	AFN61 - AFN62	,16922	-,645	49	,522

SPSS analysis paired sample T-Test implemented on the questions and find the statistically significance results both in organization and method sophistication factors and details are shown in Table 39.

Table 39: Statistical comparison of first and second survey questions

		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 10	MS20-Şirketimiz güçlü bir iç iletişimi destekleyecek metodlar kullanmaktadır. - MS21-Şirketimiz güçlü bir iç iletişimi destekleyecek metodlar kullanmaktadır.	,280	,970	,137	,004	,556	2,042	49	,047
Pair 25	ORG60-Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır. - ORG61-Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır.	,260	,876	,124	,011	,509	2,098	49	,041

Pair 27	ORG80-Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır. - ORG81-Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır.	,240	,822	,116	,006	,474	2,064	49	,044

Statistical tests show us that in organization and method sophistication in the foresight decreased in the period between two surveys.

3.2.Results

In the quantitative study, statistical analysis provide information that factors except organization and method sophistication are improved regarding to the foresight maturity model. Some factor items are removed from the initial factors that the new factors provide satisfactory results of research. Absorptive capacity factors are all improved during the two surveys duration.

CHAPTER IV: DISCUSSION

4.1.Discussion

The main target of the dissertation research is to investigate how foresight activities affect organizational agility and understand the logic behind the organizational agility sense dimension. The conducted surveys give information about effects of corporate foresight activity on organizational agility

The research focused on agile implementation in software industry and focused areas accordingly: understand the information usage, acquisition, organization, people&network, culture from corporate foresight with potential, realized absorptive capacity areas.

Most of the organizational agility research are generally focus on the production line process and method improvements. The connection between the environment and the organization is crucial to know about what to do about change in the environment which is categorized as sense dimension of organizational agility. Corporate foresight and absorptive capacity activities are used to build connection practices, methods and activities with the external environment of the organization. The research hypothesis lies in these facts and understand their relation and effects to the organization.

The main expectation with the foresight activity is the improvement in areas of corporate foresight and absorptive capacity. The main survey results show that there are small improvements in corporate foresight areas and besides decrease in method sophistication and organization. There is increase on absorptive capacity factors. This result in corporate foresight areas is unexpected at the beginning of the research. Decreased areas are detailed in Table 40.

Table 40: Survey decrease areas in method sophistication and organization.

MS-Our company uses methods to support strong internal communication. - MS-Şirketimiz güçlü bir iç iletişimi destekleyecek metodlar kullanmaktadır.
ORG- Our foresight activities for the future are related to strategic management. ORG-Geleceğe yönelik öngörü faaliyetlerimiz stratejik yönetim ile bağlantılıdır.
ORG- Our foresight activities for the future are related to R&D. ORG-Geleceğe yönelik öngörü faaliyetlerimiz Ar-Ge ile bağlantılıdır.

In the survey there is only one open ended question which aims to understand the main obstacles on foresight activities, detailed in Table 41. After the two survey results coded and compared, then the increase in management is clearly seen in Table 42. Respondents main arguments are the lack of vision and modern management practices. Bureaucracy and pressure on legacy work are the other reasons behind the obstacles on foresight activities. Managerial support is a need to provide employee enthusiasm for their and organization's environment.

The other reason to work on foresight activities is lack of time. In general, legacy work take their time and there is no available time to search, observe and understand change and other environment related activities. The high volume work make pressure to participants so they can only focus their planned and assigned tasks. For that reason, they couldn't involve personally or team level foresight activities which is crucial for organizational agility.

The last obstacle is the resource which includes reaching different type of documents and books, attending events and conferences, reducing research and development budget and lack of competencies.

Table 41: Open ended question details

Şirketimizde geleceğe yönelik araştırma faaliyetlerinde bulunan insanların karşılaştığı başlıca engeller nelerdir?
What are the main obstacles faced by foresighters in your company?

Table 42: Open ended question results from the two surveys

Reasons	Total Number(Survey 1)	Percentage (Survey 1)	Total Number(Survey 2)	Percentage (Survey 2)
Time	50	44,2	32	34,4
Management	29	25,7	16	17,2
Resource	9	8	20	21,5
Resistance	4	3,5	3	3,2
Support	1	0,9	5	5,4
Other	20	17,7	17	18,3
Grand Total	113	100	93	100

When both the results obtained in the surveys and the open-ended questions are evaluated, it can be stated that the change related to foresight maturity can be observed. Especially when the negative factors are evaluated, the reasons behind them cannot be excluded from the survey results. This result, which emerged out of the expected while starting the studies, was evaluated. With a second study to be done after this evaluation, the reasons behind the negative factors will be tried to be found.

STUDY 2 : UNDERSTANDING REASONS BEHIND DECREASE IN CORPORATE FORESIGHT FACTORS

When the results of the survey conducted in Study 1 were examined, there was an increase in foresight maturity areas, but an unexpected decrease was observed in the areas of organization and method sophistication. When the studies were first started, it was tried to investigate what caused this result, which was the opposite of expectations. However, it was observed that the survey results were not enough to explain the decrease in the related areas. For this reason, a qualitative study was planned to find the reason for the decline with a second study, which we named as Study 2. Twenty people from different roles were included in this study who answered the survey. For the Study 2 study, the details of the theoretical framework, method and empirical results will be given in the next section.

CHAPTER V: THEORETICAL FRAMEWORK

5.1.Ceremonial Adoption

Decreases were observed in foresight maturity areas as a result of surveys, an interview was planned to investigate the reasons. When the results of the surveys are evaluated, studies that are thought to be the cause of this decrease have been investigated in the literature. Due to the nature of the ceremonial adoption, it is thought to be a suitable theoretical explanation for the reason for the decline in the survey results. In particular, the stage that a new practice has reached in the implementation of the organization may be appropriate to explain such a situation(Ercek, 2006).

Firms and organizations are working to implement and adapt various practices inside the organization which are related to different strategic management fields. Integration of new practices inside the organizations can be successfully completed, but in some cases organizations integrates new practices outwardly and the efforts are not enough to implement the integration successfully (Dick & Collings, 2014). This type of outwardly practice adoption termed as ritual adoption. Ritual adoption term can be named differently in the literature as ceremonial, symbolic or mimetic adoption (Fushimi, 2019). Ceremonial adoption depends on terminologies in institutional theory like decoupling, isomorphism, and mimicry.

Institutional theory focuses on the organizations and relationship between their social, political and economic environments. Formal structures in the environment have a direct effect on organizational behavior. Environmental or institutional factors build rules, norms and beliefs which organizations are operate by adapting to these rules and forces to be legitimate. Legitimacy is a desired status and without it organizations couldn’t continue their operations or can continue in a limited space in the environment. All organizations work to be legitimate inside their environment and when they are legitimate enough then their organizational structures and functions become isomorphic. To sum up, organizations which are in the same institutional context became isomorphic (Meyer & Rowan, 1977; Zucker, 1987).

Organizations generally adopt practices to improve their processes and operations for efficiency. This type of practice adoption works successfully because of its purpose. On the other hand,

organizations which adopt practices to become legitimate can be ceremonial. Ceremonial adopted practices couldn't inserted inside the all organizational levels and integration with existing processes and managerial system could be limited (Fushimi, 2019).

In general, practices which are internationally accepted by organizations, practice adoptions by local organizations, branches or departments became problematic. Their practice adoption reason is to be legitimate or the main organizational unit pushes new practices to be implemented inside the organization. HRM practices like TQM, ISO are the major practice adoption examples(Ercek, 2006; Özen, 2002).

Practice transfer process can be divided into three dimensions. The first one is implemented, the second one is internalized and the last dimension is integrated. In the implemented phase organization starts to implement new practices and these practices can be visible inside the organization. Every practice have a base on values and meanings. When organizations not only implement practices visible, but also internalize the values and meanings behind these practices, then can be classified as internalized. When newly implemented and internalized practices integrated with the existing practices and routines, the last phase of practice transfer completed which is named as integrated (Fushimi, 2019).

In the literature especially in the HRM area, ceremonial adoption can be defined as the first phase of the practice transfer. In the first phase of the practice transfer, organizations shows visual practice adoption which is generally seems ceremonial. After this phase the other phases as internalization and integration are served to practices to be transferred and as a result of that organization ceremonial adoption became actual adoption.

In some practice transfer attempts which is not adapted to the local context can be unsuccessful and new practices couldn't integrate to the existing ones. To overcome such problems, some organizations use hybridization process. In hybridization, organizations transfer practices by adapting and transforming for a successful transfer (Fushimi, 2019).

5.2.Organizational Change in Agile Transformation

Agile transformation activities trigger a massive change in organizations. It requires radical changes in many areas from the current working culture and teams to hierarchical structuring. These changes are constructed by the use of norms and practices specific to agile transformation within the organization. In the literature, the motivations for transition to agile and the obstacles within the organization during these transition stages will be examined and the change that has emerged as a result of the survey will be tried to be explained.

5.2.1. Motivations for Agile Transformation

According to the institutional theory, organizations initially implement new management practices within the organization to increase efficiency and effectiveness (Zucker, 1987). When new management practices find a specific application area, the purpose of implementation, which is efficiency and effectiveness at the beginning, provides institutionalization on behalf of other organizations. After any practice is implemented by early adopters, the main purpose of other organizations to implement these practices is to be legitimate. Organizations exhibit similar behaviors to become legitimate, and this situation is called isomorphism (Meyer & Rowan, 1977). As a result of this, organizations try to adopt new management practices in order to be legitimate in their environment, regardless of the initial purpose of new management practices. When they adapt these practices, they provide isomorphic behaviours in the environment and can continue their existence legitimately in the environment.

It was stated that there should be two basic steps in the studies for the adoption of the practices. The first is acceptance and the second is implementation. The acceptance of a practice can be stated as the first step that ensures the success of the implementation. In the acceptance step, it is important to see the value of the practice related to sense within the organization. If this stage is successful, it will be deemed appropriate by the practical organization, but additional effort may be required for implementation. At this stage, it will be beneficial for the managers to spread them within the organization as a discourse. During the implementation phase, the spread of methods,

policies and norms related to practice becomes important. Discourse can help at this stage by emphasizing the differences in detail and practice (Gondo & Amis, 2013).

On the other hand, adoption of practices can occur without any problems if the actors within the organization accept the need for practical adoption. However, if formal and informal structures do not make acceptance, this may hinder the adoption of practices. The most important way to overcome this is to ensure acceptance within the organization.

Agile transformation studies basically address the holistic change of the organization. Therefore, agile norms, practices and methods are used within organizations to make the transformation. There may be different motivations in the adoption of agile practices to organizations. On the basis of the agile transformation, organizations want to be effective and efficient. In addition, delivering more work and quickly adapting to change are among the desired behaviors(Ševčovič, 2019). Organizations that first applied agile practices tried to integrate new practices, methods and processes into the organization in these motivations. Organizations that come after the early adopters want to make agile practices a part of their strategy, as it is now a common practice. In addition, they want to be legitimate in their environment by integrating these practices with an institutionalization perspective.

In software companies, although the motivation is similar, the structures used in small-scale business become unmanageable as the teams grow. Doing business according to the commitment and keeping up with this time causes problems in teams. The delay of the work and the lead times are getting longer, creating a problem for both the team and the organization. All these situations create chaotic problems within the organization. In addition, the desire to switch to a continuous delivery structure instead of the deadlines for delivery triggers the change. For all these reasons, software companies want to work on agile transformation (Paasivaara, Behm, Lassenius, & Hallikainen, 2018).

Increasing interaction with an organizational structure in which the hierarchy decreases, which should happen in agile transformation.

It is desired to develop a business culture as a team by moving from an individual performance-oriented structure to team-based performance.

It is aimed to work styles in which processes and documentation are reduced and the way of working interactively with the customer becomes widespread. The main reason for all this is to improve efficiency and effectiveness. Although the first practitioners started to work for these purposes, afterwards, they do agile transformation studies to become legitimate by other organizations.

6.2.2. Challenges of Organizational Change

In organizational changes, resistance and challenges are encountered within the organization. It is more likely to encounter such situations, especially with changes affecting the whole organization (Gupta, 2018; McConnell, 2018). The organizational barriers or difficulties encountered make the transformation difficult or even cause it to fail (Bovey & Hede, 2001; Keller & Aiken, 2012). Although managers understand the importance of change in transformation efforts, they are lacking in how to implement practices subject to this change.

Agile transformation efforts address massive transformation for organizations. It foresees the change that affects not only the production line, but also the overall structure and hierarchy of the organization, team setups, HR structure and practices. Such a change naturally faces obstacles within the organization.

Possible resistance points in organizational changes can be specified as follows:

Resistance: When people in the organization think that the change will change their current position or make it worse, there is resistance to change. This resistance constitutes one of the biggest obstacles to change. Resistance to change is more intense, especially in industries and tools that are shaped by regulations (Julian, Noble, & Anslow, 2019). The reason that creates resistance to change is as follows:

- “Employees attitudes towards change”
- “Uncertainty(Fear of the unknown)”
- “Lack of understanding the firm's intentions”
- “Fear of failure”
- “Disruption of routine”

- “Increased workload”
- “Lack of rewards for implementing change”
- “Perceived loss of control, security or status”
- “Poor leadership”
- “Dysfunctional organizational culture”
- “Organizational size and rigidity”
- “Lack of management support for the change”
- “Lack of trust between management and employees”
- “Inability or unwillingness of management to deal with resistance”
- “Organizational politics”
- “Internal conflict for resources”
- “Lack of participation due to top-down steering”
- “Internal Conflict for Resources”
- “Lack of consequences for inadequate or poor performance”
- “The content of change”
- “Poor implementation planning”

6.2.3. Challenges of Agility Changes

Agile transformation is also a great transformation, and we can specify the following obstacles in addition to the obstacles mentioned above.

Intense pressure of the environment and with the regulatory effects create an obstacle for these changes in structures that are resistant to change (Julian et al., 2019). Sectors such as finance, pharma, energy where regulations are intense, are more resistant to changes.

On the other hand, in a multi-team environment some of the teams in the organization have transformed and the other part has not transformed creates an obstacle for a holistic transformation. In addition, the irregular structure created by teams transforming in different ways is an obstacle for the entire organization (Mako, 2019).Similar to the multi-team environment, the continuation of the old-style organizational hierarchy or the lack of maturity of mid-level managers in this

context prevent the spread of the transformation. Agile transformation, which is tried to be built on the establishment of autonomous teams, is interrupted by the continuation of the hierarchical management approach. Traditional line manager work as an important agent as a part of command and control system. In the new type of organizations, self managed team don't need a controller, coaching and mentoring team and individuals are the valuable behaviours. For that reason managers need to shift their mindset from control to supportive role (Holbeche, 2019).

Organizations which are working to implement agile, needs support and guidance. It causes obstacles in agile transformation due to reasons such as not fully understanding or adopting agile concepts within the organization without institution-specific methods, and lack of guidance (Mako, 2019).

One of the important point in agile transformation is the form of performance management. What the criteria for performance are, how they are measured and how structures such as salary increase and bonus will be given constitute an important part of the transformation. In a non-agile organization, the performance mechanism work with the relevant manager in the hierarchy. In an agile structure, the product owner is responsible for the work output, and differentiation begins here. Measuring the performance of a self-managed team members in an agile organization with the classical method will constitute one of the most important obstacles in transformation. Ideal performance management is to use the 360-degree evaluation to be made at the team level rather than the individual and to evaluate the work outcome. A performance system that does not function in this way will create an important obstacle to agile transformation (Gerster, Dremel, & Prashant, 2018).

6.2.4. Performance Management in Agile Organizations

The basis of agile transformation efforts are teamwork, and the execution of teamwork in a self-managed structure. Collaboration and teamwork constitute the main point of business outcomes. Ongoing human resource performance practices focus on individual competencies and outputs in the research company.

However, only individual competencies are not sufficient alone, and the ability to work in harmony with the team creates the necessary conditions for agile work. Measuring and following individual

performance in classical performance management is not suitable for agile structures. Individual performance measurement increases competition and causes divisions for the team. For all these reasons, the following metrics can be used for individual performance in an agile team (Gamble & Hale, 2013):

- Contribution measures the direct participation in sprint meetings.
- Influence measures the individual effect on the team's progress.
- Impact measures the individual role in the quality of the resulted software artifact.
- Impression measures how well team members acknowledge the performance that fellow team members made toward the successful completion of the project.

All these measurements can be meaningful when they find a place in team evaluations. Therefore, it is recommended to implement team-based bonus programs instead of individual-based bonus, where the team evaluates each other 360 degrees, rewarded by the team rather than individually.

CHAPTER VI: RESEARCH MODEL AND METHOD

6.1.Research Model

Research design provides information about methods used in the thesis. In the Study 1 section, quantitative research methods use to measure the effect of a foresight activity which is organized inside the software company.

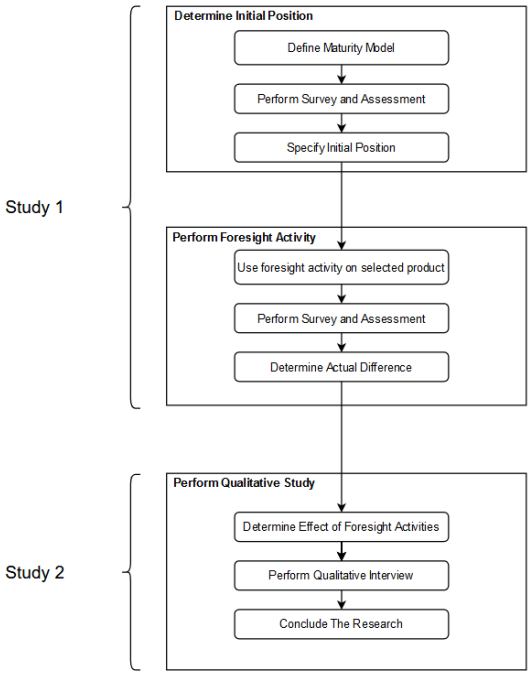
Qualitative research is conducted to provide detailed information about the quantitative measurement results about the foresight activity and organizational agility practices in Study 1.

6.2.Method

6.3.Procedure

The research model of the thesis described in Figure 24:

Figure 24: Thesis overall research model



Consequently, the ultimate goal of this study is to understand how foresight activities affect organizational agility sense dimension and absorptive capacity.

6.4.Sample

The data collection process continues with qualitative research after Study 1. Total of 20 interview participants are selected inside the software company from managers, product managers, architects and team members. These participants selected from the attendants and non-attendents of the foresight activity.

For the purpose of researching organizational agility inside the software company, interviews with respondents give insights about the survey responses. Total of 20 participants are selected from survey respondents. Their interviews conducted online by using Zoom program and all interviews recorded by participants' approval. Recorded interviews decoded and coding process implemented by using QDA Miner.

6.5.Measures

Interviews are performed after the survey process completed. Interview questions are prepared based on survey questions which are detailed in Table 43.

Table 43: Qualitative research questions and their categories

Categories	Interview questions	Mülakat soruları
1. Acquire information, information usage, potential absorptive capacity	What information is collected within the company and how and by whom?	Şirket içerisinde hangi bilgiler, kimler tarafından nasıl toplanmaktadır?

2. Assimilate information, method sophistication, realized absorptive capacity	How is the information obtained evaluated within the company?	Elde edilen bilgiler şirket içerisinde nasıl değerlendirilmektedir?
3. People	Who determine the strategy and future studies within the company, collect information and who are they?	Şirket içerisinde stratejiyi ve geleceğe dönük çalışmaları belirleyen ve bilgileri toplayan kimlerdir?
4. Network	How is inside information distributed within the company?	Şirket içi bilgi şirket içerisinde nasıl dağılmaktadır?
5. Organization	What is this information used for within the company?	Bu bilgiler şirket içerisinde ne amaçla kullanılmaktadır?
6. Culture	How would you evaluate our company values and culture in terms of obtaining and using information?	Şirket değerlerimiz ve kültürümüzü bilgi elde etmek ve kullanmak anlamında nasıl değerlendirirsin?

6.6.Data Analysis

Interview data coded and gathered to find unexplained areas which are not covered or explained by the quantitative study. For that reason, interview questions were prepared to understand these areas.

For interviews, video conference tool Zoom used and decoded to text by using standard office tools. QDA Miner software is used to code the text data and codes analyzed by using this tool.

CHAPTER VII:ANALYSIS

The two survey results are presented in the Study 1 empirical results section. In this section qualitative results are represented here with their code analysis. At the end, summary of both qualitative results will be represented.

7.1.Interview Results

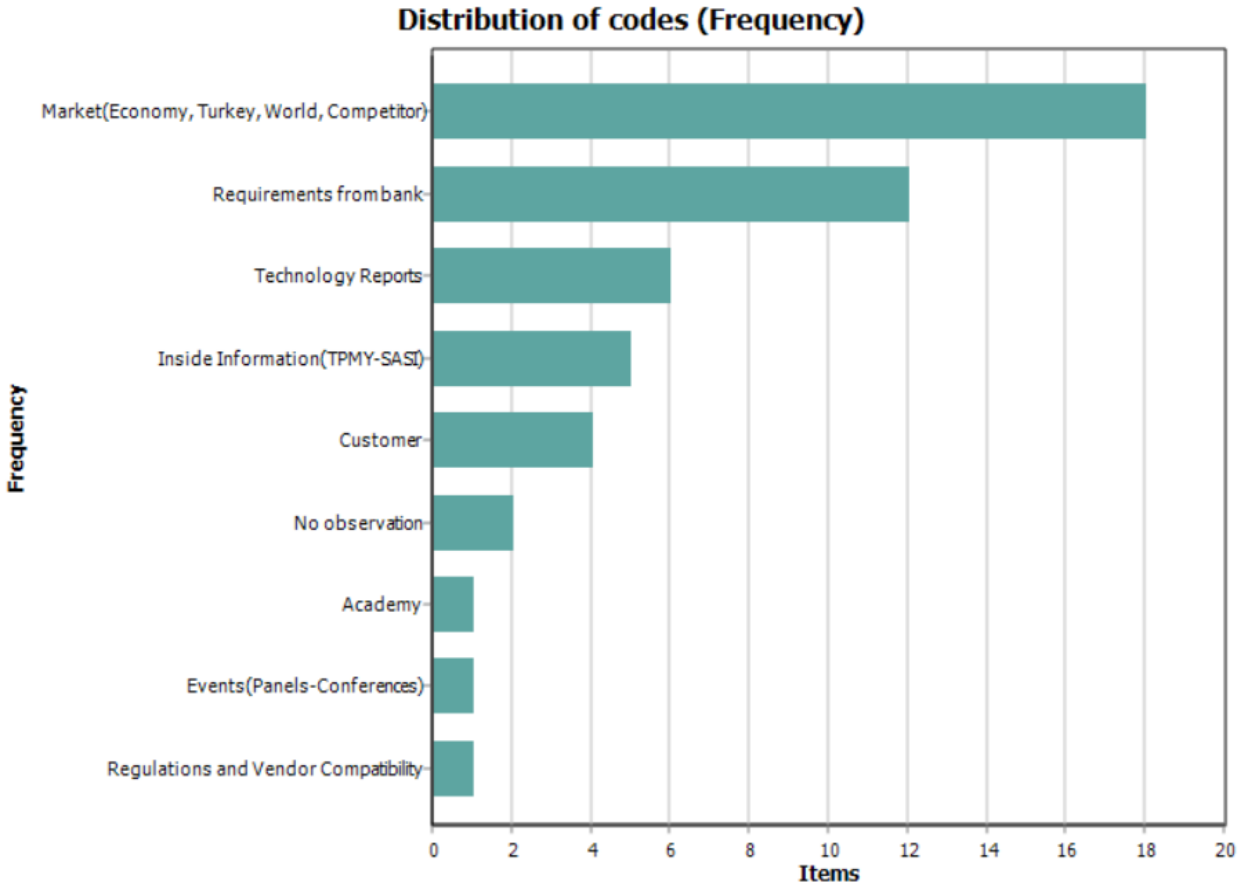
As a result of conducted surveys, it was expected that foresight maturity would increase after the foresight activity, but it was measured that there was a decrease in certain areas rather than an increase. A qualitative study was conducted with the survey participants to investigate the reasons for this decrease.

The main result is that the interaction frequency and density of the company with the environment is periodically changed throughout the organization. Due to this periodicity, the company's foresight maturity tends to decrease in the time duration between the two surveys. In addition, the results show ceremonial characteristics of the studies for agility (A total of 20 participants from different roles were interviewed).

7.1.1. Acquire Information

Although the majority of the participants provided the information grouped as market, the guiding effect of the bank on the software company seems very clear. Therefore, no matter how open it may seem, the bank has a predominant way of doing business. The customer is in the lowest ranks. Distribution of codes about acquire information are shown in Figure 25.

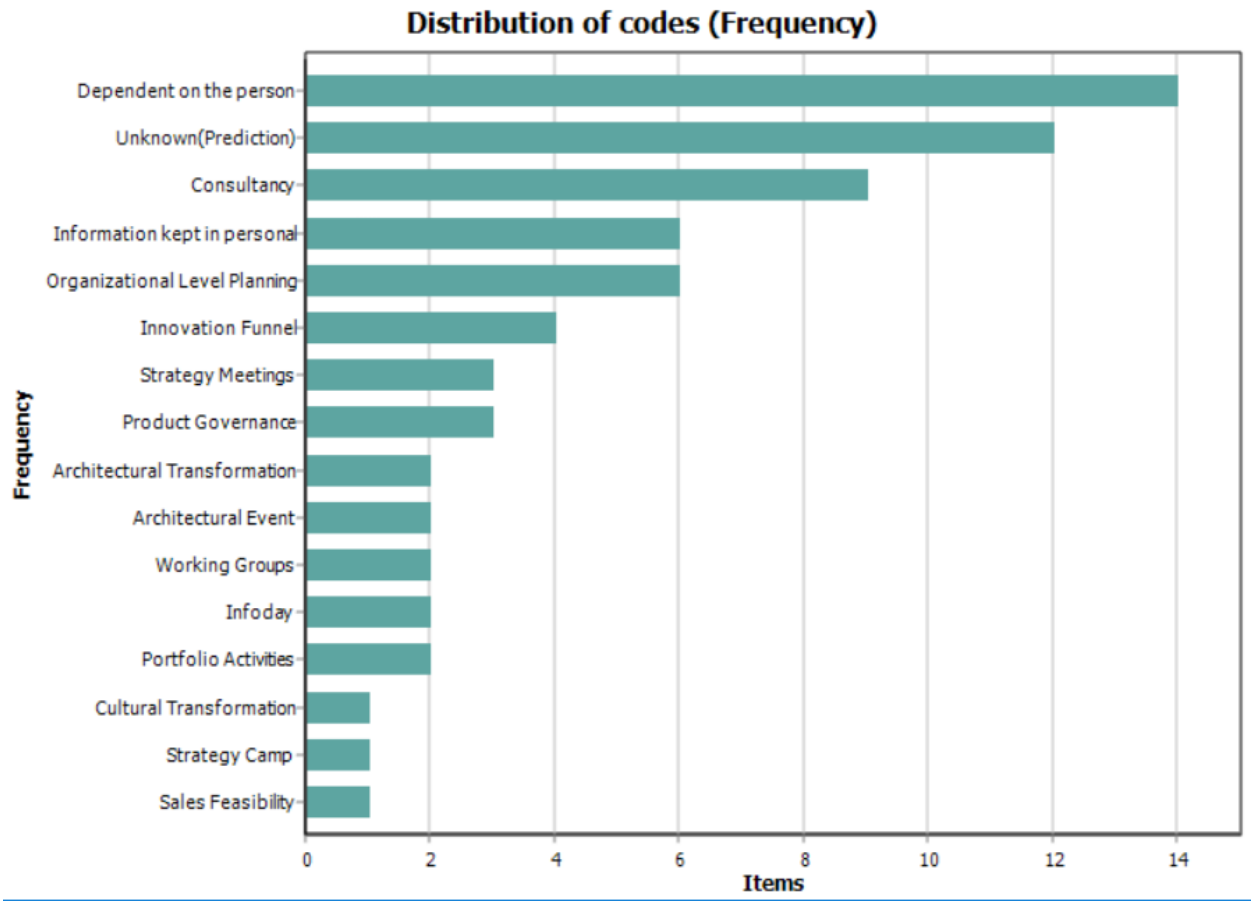
Figure 25: Distribution of codes in acquire information category



7.1.2. Method Sophistication

In the part that the organization's way of collecting and processing external information has a standard structure, it has been observed that it is predominantly dependent on the person (General Manager-CEO) and is unknown even if it is in the second rank.
For this reason, it is observed that the structure of receiving and processing the information of the company is completely managed by the top management according to its own management style. Distribution of codes about method sophistication are shown in Figure26.

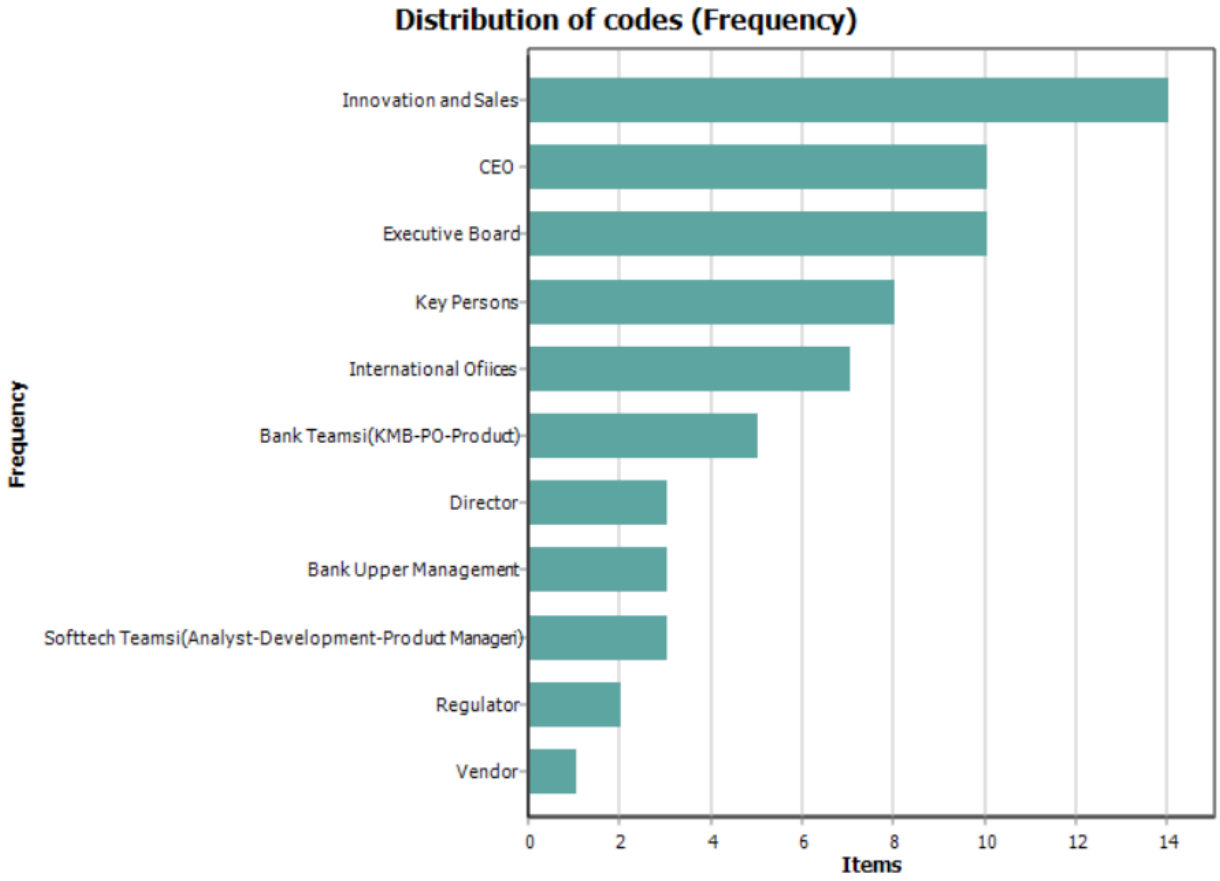
Figure 26: Distribution of codes in method sophistication category



7.1.3. People

In the part of who is involved in the information gathering and evaluation process, the top management has come to the fore. It is clear that there is actually a hierarchy here. Distribution of codes about people are shown in Figure 27.

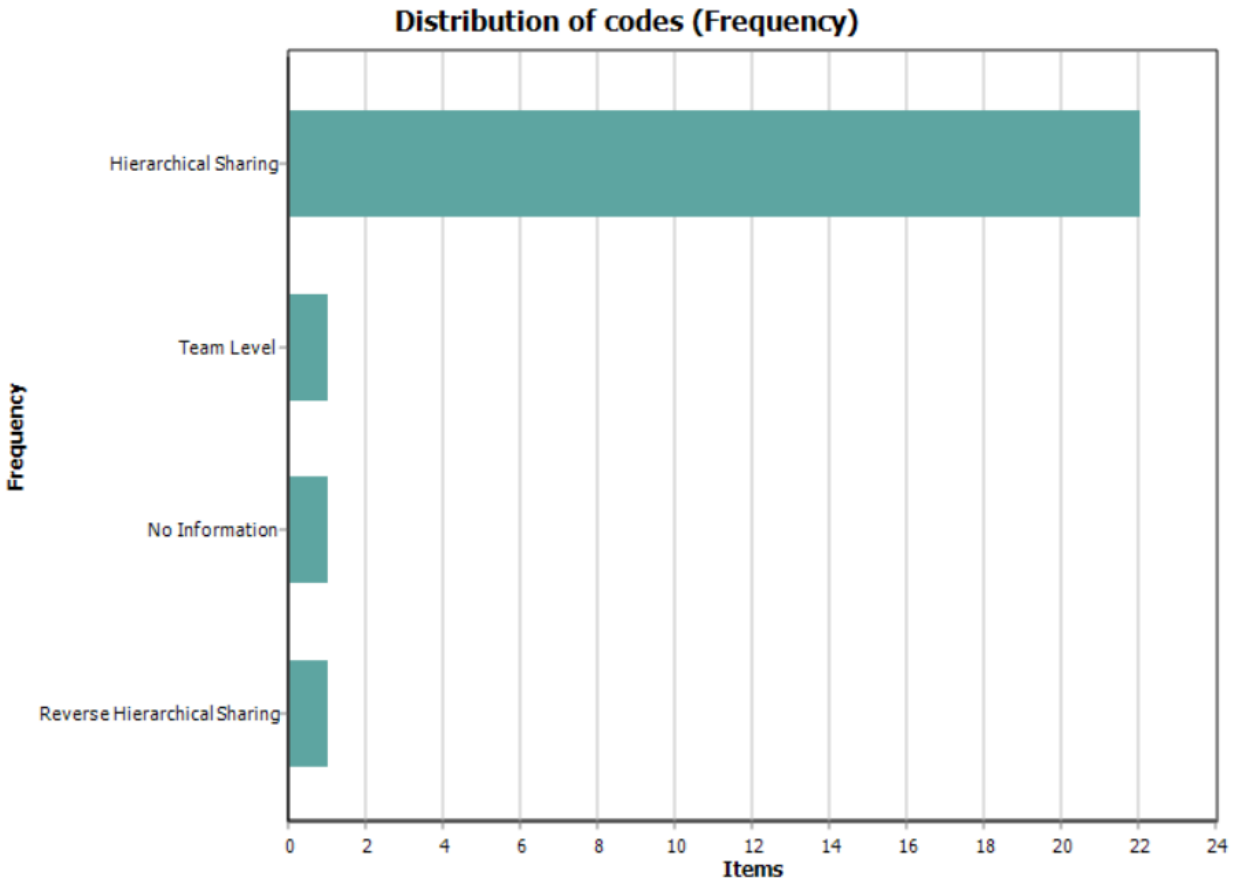
Figure 27: Distribution of codes in people category



7.1.4. Organization

When looking at the way this information is distributed for the organization, it is seen that the information is mostly shared hierarchically and conversely, the sharing is very low. Distribution of codes about organization are shown in Figure 28.

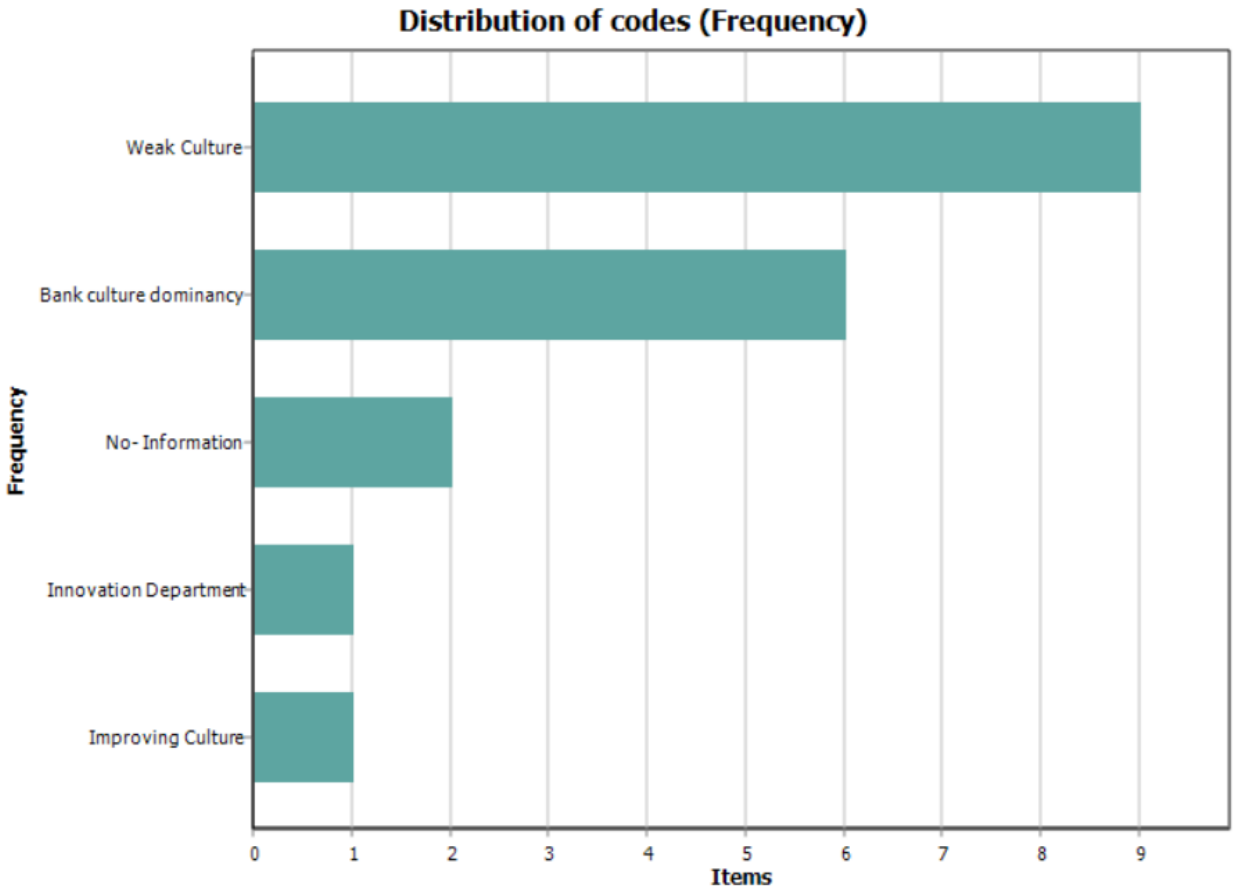
Figure 28: Distribution of codes in organization category



7.1.5. Culture

The part of the organizational culture regarding information acquisition, use and processing was found to be weak. Actually, this result supports the previous result. It is inevitable that the corporate culture is weak in an area dominated by hierarchical and top management. Distribution of codes about culture are shown in Figure 29.

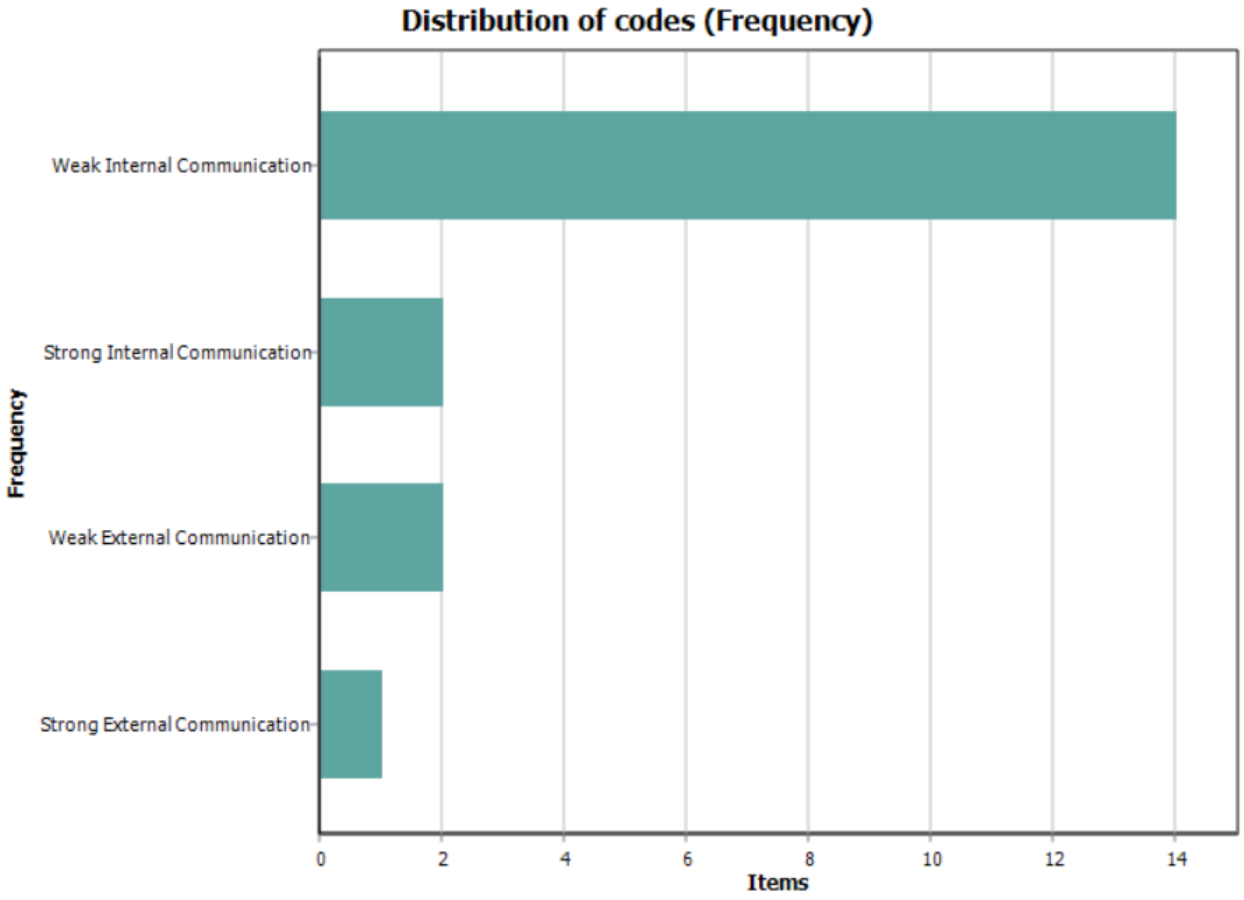
Figure 29: Distribution of codes in culture category



7.1.6. Network

In the sharing of information inside and outside the company, it continues to be dependent on the person. Therefore, there is poor internal communication. External communication is weak due to bank domination over the software company. Distribution of codes about network are shown in Figure 30.

Figure 30: Distribution of codes in network category

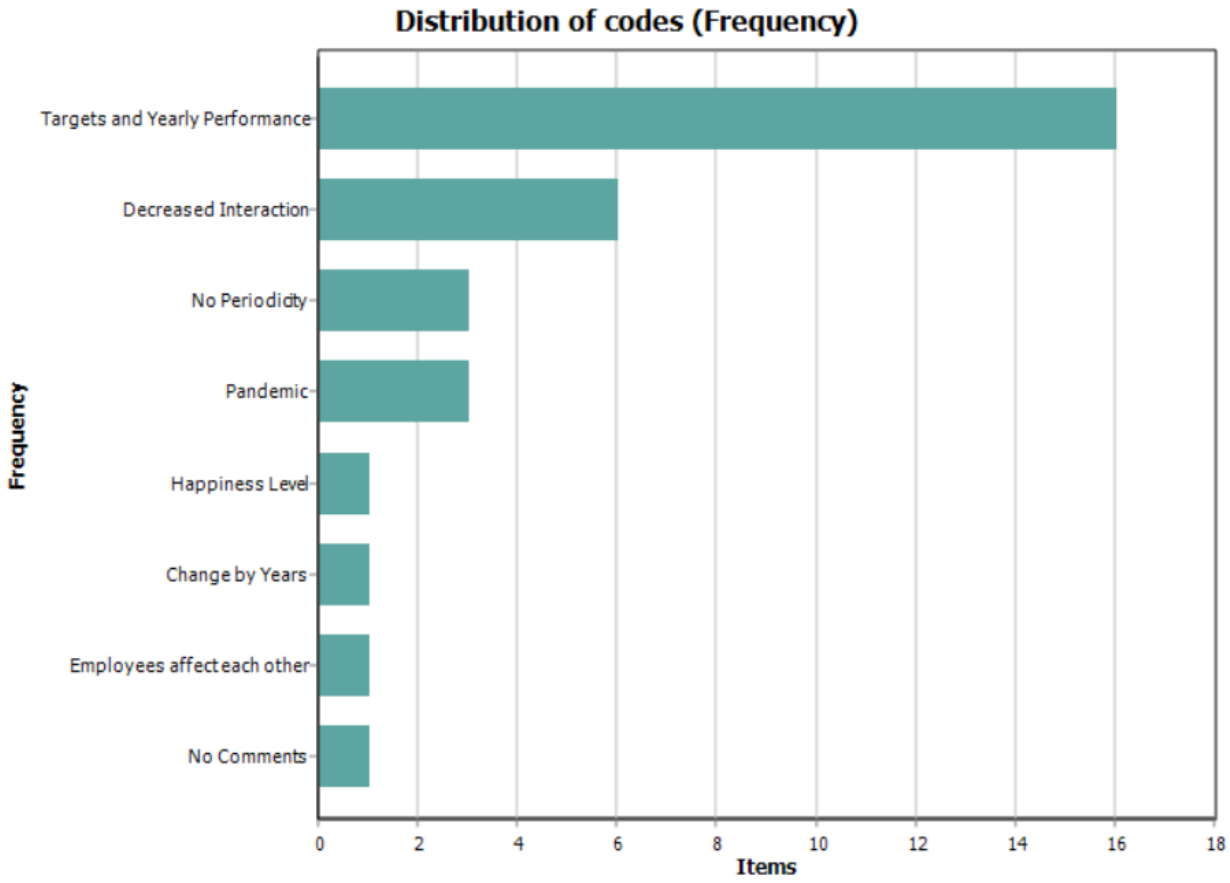


7.1.7. Periodicity

As mentioned at the beginning, there is periodicity in the approach throughout the organization. This periodicity is a situation to be handled differently. Distribution of codes about periodicity are shown in Figure 31. Evaluations are as follows:

- It is that the pressure of target and performance cannot focus people on a different area outside of the business and therefore there may be a decrease in this area, especially from February to March.
- It is that the interactions of the general manager have decreased over time.
- It was stated that salary increases and bonuses also affect periodicity. The employee who cannot get the expected is unhappy and then behaves negatively.

Figure 31: Distribution of codes in periodicity category



7.2.Summary of Results

In the quantitative study, statistical analysis show correlations and confirmatory factor analysis provide information that factors are parallel to the maturity model. Some factor items are removed from the initial factors that the new factors provide satisfactory results of research.

Addition to quantitative analysis, qualitative analysis done with the interview data. Interviews' coded structure provide information about details which are not released from the survey results. Interviews also provide the answer to the decrease areas in the survey results.

CHAPTER VIII: DISCUSSION AND ANALYSIS

The main target of the dissertation research is to investigate how foresight activities affect organizational agility and understand the logic behind the organizational agility sense dimension.

The results obtained in the first study led to a second study. In the second study, interviews were made with participants from different roles and the results were coded and details were given in the previous section. Main areas of corporate foresight and absorptive capacity detailed by questions in the interview and answers are coded to understand the data in a statistical way. Organization of agile transformation motivations and obstacles encountered in this transformation, it has been observed ties with the results of the research literature examined. In the next section, the research results will be stated together with the information in the literature.

8.1.Discussion on Agile Principles and Institutional Theory

Main motivations of an agile transformation is efficiency and effectiveness (Zucker, 1987). In the institutionalization process, late adopters are behave different than the early adopters. Legitimacy is the main motivation for late adopters and isomorphic behaviors occurs when they are working to implement similar practices inside the organization (Meyer & Rowan, 1977).

Similar to an organization change, agile transformation motivations are similar as effectiveness and efficiency. Increase in production and high adaptability capacities are other motivators for organizations (Ševčovič, 2019). Early adopters of agile transformation do the transformation inside their strategy. Late adopters implement in isomorphic behavior and aim is to provide legitimacy.

In software companies, organizational changes provide similar motivations like other type of companies (Paasivaara et al., 2018). In agile transformation organization should be:

- Flat organizational structure by decreasing hierarchy
- Collaboration culture with team-based performance, rather than individual performance.
- Simple processes and documentation rather than complex process and documentation

Especially in the qualitative study carried out in the thesis, although the software company is doing agile transformation work, the results do not give parallel results in this sense. With the company being a subsidiary of a bank, the dominance of the parent company was revealed in the results. This situation limits the range of action due to the parent company ties, although the company aims to change its organization.

Interview participants' answers can support this:

"Now, of course, there are a lot of bankers in our board of directors ... I think that he also did something, he gave feedback when we were determining our strategy."

"Now we are a little bank dependent. Maybe they are facing some barriers stemming from bank dependency."

"Bank's strategy and company's strategy are a little mixed up, you actually go to what bank says there."

"Now, due to its structure, I do not think that our company can determine anything very inward with the bank and independent from the bank."

Another issue is that the dominant in the field of method sophistication is that it depends on people rather than processes and methods. Similarly, this situation does not give the expected output. It can be easily seen that the CEO and executive board are predominant, especially during the access and processing of information through the strategy process. While internal and external interaction should be intense in agile structures, it is seen that weak internal communication results. The sharing of information within the organization is completely hierarchical, and the weak culture supports all these outputs.

Interview participants' answers can support this:

"The researches that have been done, the data collected must be circulating among in small group."

"I do not think it depends much on the process, at least in our company."

"Basically, we can say that some key people starting from the CEO and top management and appointed by them, these are mostly at director level, we can say at director level."

“Again, these tasks are actually assigned to people in this critical role. Again by the management and the general manager.”

“I'm not sure if there are such processes, so I think we are very new in this regard and that we are in beginning stages.”

“Frankly, in our company, in the structure I observe, this place is entirely up to each manager's own style.”

Finally, it does not comply with agile principles in this case, as individual performance management is the main determinant of salary increase and bonus rates.

As can be seen in the results of the study conducted in the thesis, the decrease in the hierarchy, the increase in team and individual interaction, and the sharing of knowledge in the software company, which are the fundamentals of agile transformation, do not appear in the research results. For this reason, efficiency decreases, especially in change efforts, and organizations seem to have changed in appearance. This can actually be seen as the activities that are done to be isomorphic in the environment, rather than reaching the real intended structure.

Interview participants’ answers can support this:

“I think the top down flow of information is in the company. Mostly. Especially in these matters, there are not many expectations from the employees. Therefore, the flow of information is also limited. Generally from top to bottom.”

“But the general, so what I see here is usually a top down rather than a bottom up idea flow.”

“Ok, employees are not consulted or asked about much. This is my impression. In that sense, there is something in internal communication.”

“It's as if the decisions about the direction of the company are made behind closed doors, or I feel like they are coming from above, or maybe we are moving forward with one person's vision, I don't know.”

“I think it is not in a professional sense, I think this type of information is spread through amateurish conversations.”

“I don't think it spreads within the teams, there is always a top down approach used.”

8.2.Discussion on Ceremonial Adoption

From another point of view, as Gondo and Amis stated (Gondo & Amis, 2013), practices need to be accepted and then implemented in order to be adopted in the organization. At this stage, the responsibilities of middle-level managers increase. The results show that the practices of agility cannot be implemented. Mid-level managers do not appear in the results of the research, as the results are dominated by the senior management. In this case, it can be deduced that the efficiency of middle-level managers is low.

In ceremonial adoption view, the results in each sub areas give information about the how practices and methods use inside the company. At the end of the study, it is shown that some practices implemented but they are not internalized or integrated to the organization. In ceremonial adoption, the transfer process can be divided into three steps. The first one is implemented, the second one is internalized and the last dimension is integrated. In the implemented phase organization starts to implement new practices and these practices can be visible inside the organization. Every practice have a base on values and meanings. Before classifying practices as internalized, organizations do not only implement visible practices, but also internalize the values and meanings behind these practices. When newly implemented and internalized practices integrated with the existing practices and routines, the last phase of practice transfer completed which is named as integrated (Fushimi, 2019). For that reason the practice adoption level in the research can be categorized as ceremonial.

Ceremonial evaluation reasons from the interviews are:

- Information retrieval, processing and dissemination is done in a hierarchical way. An inverse hierarchical relationship is low. Interaction within individuals and teams are low inside the company.

- All strategic issues are evaluated and retained by the general manager (CEO) or top management team. These issues couldn’t spread throughout the organization.

- Strategic activities performed in top management are not known or anticipated by the employees.

• The strategic work done by the top management is based on a personal approach not a systematic or methodological way.

• In parallel with all these statements, corporate culture is weak in strategic area.

• While there should be continuity regarding information within the company, there is periodicity.

The results show that there is need to move forward on agility practices and methods to internalize and integrate by every kind of roles inside the company. Without the next steps, all activities and work done inside the company can be useless and seems ceremonial. Building flat hierarchy, giving time and resources to all employees and upper management support, which is the most important, should be consistent and powerful to strengthen agility practices and methods. With the help of these changes inside the company organizational agility will become more mature and the transformation can enter to the internalize and integrate levels.

8.3.Discussion on Agile Transformation Challenges

Although motivations are important in organizational changes, overcoming the problems encountered in the change process is of particular importance. While various obstacles that can be experienced in every organizational change are encountered, obstacles specific to agile transformation are also observed.

Especially regulatory sectors are most resistant to change. Since the organization work within the research is a software company owned by a bank, we can state that the regulatory effects also apply to this situation.

On the other hand, gradual transformation creates hybrid team structures, some of the teams work with legacy structures and the rest of them work in new practices, norms and methods. This type of organizations can be an obstacle on holistic transformation (Laanti, 2017; Mako, 2019).

The organization in which the research was conducted determined the pilot teams and made a plan to move towards the agile working style in other teams with the advancement of these pilot teams.

In this direction, heterogeneous team structures have been found in the organization and have created difficulties in transitioning to the desired shape in terms of business style and practices.

Flat hierarchy with increased interaction generates information flows inside the company. Hierarchical decision making mechanisms also prevent building autonomous team structures which is also essential for agile team structure (Laanti, 2017; Mako, 2019).

Especially the qualitative study results showed that hierarchy is dominant in the organization that was researched. It can be easily seen that the CEO and executive board are predominant, especially during the access and proccessing of information. The sharing of information and knowledge within the organization becomes completely hierarchical. What should be is that the interaction of the teams with each other and the management is intense and acting independently of the hierarchy.

It causes obstacles in agile transformation due to reasons such as not fully understanding or adopting agile concepts within the organization, lack of institution-specific methods, and lack of guidance (Laanti, 2017; Mako, 2019).

The unknown answers given to the questions asked in the research organization show that the structures and activities built within the company are not internalized and known sufficiently. For this reason, it can be said that the relevant transformation activities within the organization are met with obstacles.

8.4.Discussion on Performance Management and Periodicity

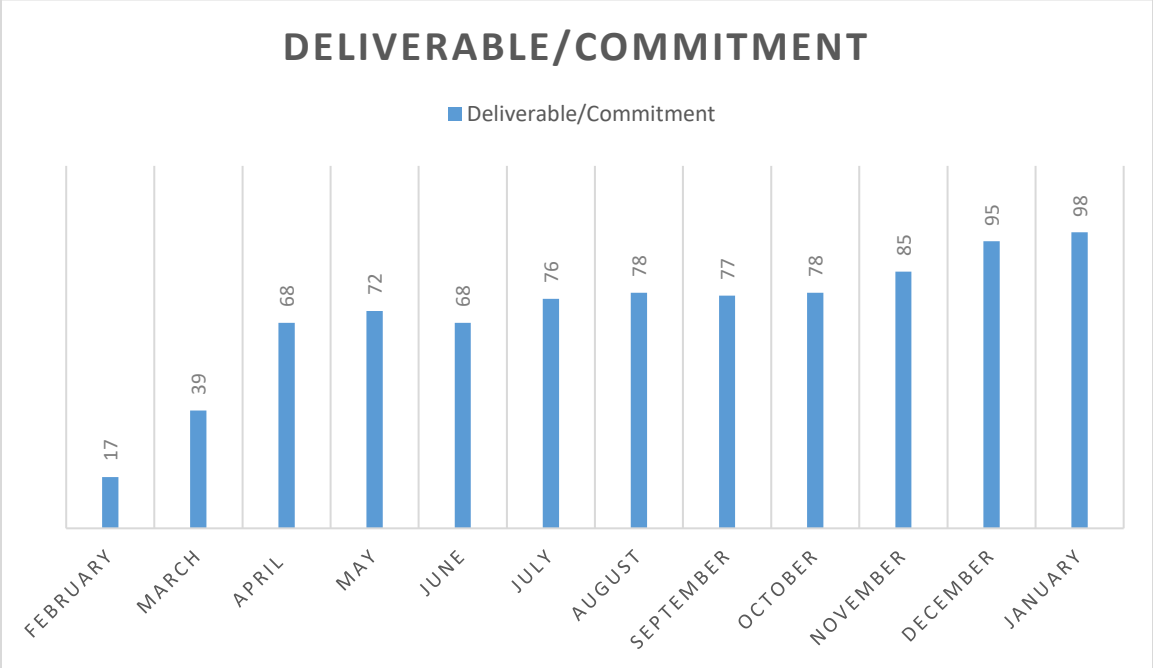
Legacy organizations(non-agile) use performance metrics by measuring individual performance. The result of the performance measurement affects mail increase, bonus rates and promotions. Contrary to this, in agile autonomous teams work in a collaborative manner and an individual performance management couldn’t fit. Performance management should use 360 degrees evaluation to remove a major obstacle from the organization.

In the research company, performance evaluation is made every six months. As a result of the evaluation made between February and March of each year, salary increases and bonuses of the employees are determined. In addition, it is expected to obtain a certain performance grade in a

sustainable manner among the promotion criteria. Company performance criteria, on the other hand, are predominantly made by fulfilling the yearly commitments and their realizations and delays. These two criteria affect the performance of individuals by 50%. This is reflected in the results of the research, as agile structures do not have the commitment required, but structures according to business value and 360 team evaluation. According to the performance period, the intensity of work, motivation changes, and the changes desired to be made within the organization cannot find an effective application area due to this system. Failure to be promoted based on performance, not receiving the expected wage increase or bonus may also cause employees to act opposite to what is expected. The performance management cycle also triggers periodicity inside the company by affecting all employees.

Periodicity can be seen in the deliverable/commitment ratio, which fulfills 50% of yearly performance grade. At the end of the years teams focused on delivery, but in the beginning of the year commitment ratio is low. Every year, the company performs similar like Figure 32 on the main performance measure.

Figure 32: Software company deliverable/commitment ratio per month (Year 2019)



Periodicity not only limited to performance management cycle, its also about the interaction and communication.

Interview participants' answers can support this:

"I do not think that this is owned much because people do not see its reflection, because the periodic operational workload of people increases, especially the workload of people also increases, and we are making the transformation while doing things, but I think it is beneficial because it does not touch people, I think it is not owned."

"Periodicity is the summer period, the raise period, the performance period, these things affect the ups and downs. I think that people's view of both the company and the future strategy are things that affect them."

"It seems to be fluctuating, especially at the beginning of the year, and I see that these decisions were made a little bit towards the end of the year, and more focused on other agenda. It fluctuates and people know that you need to keep that thing sync all the time, maybe it is necessary to say it over and over again."

"Because during the year, everybody focuses on the performance result of that year and they work more yearly. In fact, most periods are now quarterly, this could have been better before. People and companies also have a certain thing, the concept of time."

"The effect on the employees is as follows; I think they get a little more motivated when they get good performance results. After they get bad performance results, they become demotivated and demoralized and become a perpetrator. That is, in April, May, everyone is down, everyone is unhappy, when the performance results calculated."

To sum up, in the beginning of the research, expectation is a positive correlation between foresight activity and organizational agility sense dimension. When the two surveys are conducted and statistically analyzed, then positive correlation can be shown but especially decrease in organization and method sophistication areas are observed. This result is not an expected outcome.

The results contradict the claims Rohrbeck (Rohrbeck & Kum, 2018), that a positive correlation is expected. Interviews are planned and executed to find the reasons behind these decreases. The interview results show us that main need of organizational agility are not supported. For that reason

these unmatured areas affect the survey results negative. Unmaturity in organizational agility can be explained with ceremonial adoption that the transformation of the organization can be done in the first phase in the transformation.

8.5.Limitations of the research

Dissertation research start before the global pandemic phase of the world. Interview part conducted in the pandemic phase when employees work from home. Due to do pandemic phase, interviews are done on video conference tools. This situation generates restrictions to find the real motive/logic behind the answers and sense their attitudes and body languages more in-depth.

The number of interview respondents can be larger, but the range and the number of interviewers provide enough information to answer the decrease in survey results.

8.6.Recommendations for future research

For future studies, it could be recommended to make the similar research in different software companies inside the same country and also different countries. Different researches can provide more information and results can be compared. The behavior of the organization on organizational agility transformation can be standardized.

The second recommendation is to provide not only technological foresight activity but also organizing foresight activities in various areas like political, economical can give different aspects of the research.

The last recommendation is to do the research for a couple of years to understand the practice adoption lifecycle in detail in the same company. A couple of years later a qualitative study can be examined to understand, if the software company adopts agile practices to be legitimate or they are on the way to internalize and integrate practices.

CONCLUSION

The literature analysis has shown that the organizational agility is highly popular research area and scholars increasingly make research on this topic by explaining it in different ways and frameworks. Dynamic capabilities is the main strategic management theory of organizational agility. Dynamic capabilities, which are seizing, sensing, and transforming capacities, are built by the theoretical base of the organizational agility. Various organizational agility frameworks depend on the similar dynamic capabilities.

Organizational agility sense and response frameworks focuses on the environment and organization's internal practices, methods and structure. The connection between environment and organization itself is the main objective of the framework to categorize an organization as agile.

In this dissertation, sense dimension of organizational agility is being selected as research area. Sense dimension is the key to get information about environment and use them inside the organization to proactively manage opportunities, threats and changes. Effective implementation of sense dimension with response capability change the organization to agile.

Organization agility measurement is not easy and methodologies in the literature are not unified enough to measure these variables. For that reason corporate foresight maturity model and absortive capacity use to measure the sense dimension of organizational agility. From the results of surveys and interviews give information for dissertation analysis and following conclusions are detailed:

1. Organizational agility can be defined in various ways, supported with strategic management theories especially by dynamic capabilities. More than definition, different frameworks explain its mechanisms and relationship between environment and organization itself. In the dissertation sense and response framework used for the research. Sense part of the framework defined as the environmental recognization capacity for unexpected changes and respond part defined as response capability to the sensed changes fast and effectively. Rather than response dimension sense dimension is selected as the focus area in this dissertation.

2. In the research design with the literature support, corporate foresight can leverage the sense dimension in organizational agility. Market and consumer preference changes, political-economic changes, technological advancements are the main forces to make an organization agile. Various type of methods and practices can affect one or more areas from acquisition, method sophistication, people and networks, organization and culture used to understand these forces and respond with appropriate actions. For that reason a foresight activity was organized to understand its effect on sense of the organization. Expectation in the beginning of the research is to increase in various corporate foresight areas.
3. In the research of the dissertation one hypothesis is aimed to answer:
   Hypothesis: Corporate foresight maturity and organizational agility sense dimension will be increased by implementing a technology based foresight activity inside the organization.
   The hypothesis analyzed by conducting surveys in the initial phase. Surveys give an overall answer but are limited to give insight about the reasons of the answers.
4. Empirical results showed that the research organization can be categorized as agile. When sense dimension inspected by both surveys and interviews, the result show that the maturity of sense dimension can be different in various dimensions. The expectation is not realized when comparing two survey results especially in the organization and method sophistication areas. Increase in these areas would be an expected result but the comparison show that the results are decreased. For that reason, interviews are the research method to find the real reasons of the survey results. Interviews especially use to understand the reason why there is a decrease in method sophistication and organization areas.
5. From the interview results, decrease reasons can be explained with periodicity inside the organization. There are also hierarchical, cultural and sharing deficiencies to force the decrease in the foresight areas. These results show that ceremonial behaviours are widely applied inside the organization. From the institutional view, isomorphic motivations are the main reason to make an agile transformation inside the company. Agile transformation resistances in an organization can have an impact on the research result. Especially performance management system appears one of the most effective process on the results.

Summarizing the results of the research, sense dimension of organizational agility can be improved with foresight activities and practices. Organizational transformation can seem to be completed, but in reality it seems ceremonial and not implemented effectively.

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APPENDIX 1: First Survey Result Details

CFA GENDER STATISTICS

As a result of T-test there is no statistical significance between genders for individual factors.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AF1	Equal variances assumed	,362	,548	,195	146	,846	,02495	,12819	-,22840	,27831
	Equal variances not assumed			,197	115,414	,844	,02495	,12638	-,22538	,27529
AF2	Equal variances assumed	5,425	,021	-,235	146	,815	-,02942	,12529	-,27704	,21820
	Equal variances not assumed			-,248	129,602	,804	-,02942	,11846	-,26378	,20494
AF3	Equal variances assumed	,303	,583	,752	146	,453	,08366	,11120	-,13611	,30343
	Equal variances not assumed			,776	121,244	,439	,08366	,10778	-,12972	,29704
AF4	Equal variances assumed	5,263	,023	-2,069	146	,040	-,26937	,13021	-,52671	-,01204
	Equal variances not assumed			-2,249	137,748	,026	-,26937	,11980	-,50625	-,03249
AF5	Equal variances assumed	,191	,663	-,922	146	,358	-,09117	,09888	-,28659	,10424
	Equal variances not assumed			-,906	104,828	,367	-,09117	,10062	-,29069	,10834
AF6	Equal variances assumed	2,918	,090	-,227	146	,821	-,03586	,15779	-,34771	,27600
	Equal variances not assumed			-,235	122,074	,815	-,03586	,15258	-,33789	,26618

CFA ROLE STATISTICS

As a result of ANOVA there is no statistical significance between roles for individual factors.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
AF1	Between Groups	1,114	3	,371	,659	,579
	Within Groups	81,198	144	,564		
	Total	82,312	147			
AF2	Between Groups	2,976	3	,992	1,888	,134
	Within Groups	75,661	144	,525		
	Total	78,637	147			
AF3	Between Groups	3,625	3	1,208	2,972	,034
	Within Groups	58,534	144	,406		
	Total	62,158	147			
AF4	Between Groups	,666	3	,222	,369	,776
	Within Groups	86,717	144	,602		
	Total	87,384	147			
AF5	Between Groups	,104	3	,035	,102	,959
	Within Groups	49,135	144	,341		
	Total	49,240	147			
AF6	Between Groups	1,175	3	,392	,456	,713
	Within Groups	123,548	144	,858		
	Total	124,723	147			

CFA STRUCTURE STATISTICS

As a result of ANOVA there is no statistical significance between structure for individual factors.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
AF1	Between Groups	,322	2	,161	,285	,752
	Within Groups	81,990	145	,565		
	Total	82,312	147			
AF2	Between Groups	1,399	2	,699	1,313	,272
	Within Groups	77,238	145	,533		
	Total	78,637	147			
AF3	Between Groups	1,054	2	,527	1,251	,289
	Within Groups	61,104	145	,421		
	Total	62,158	147			
AF4	Between Groups	,098	2	,049	,081	,922
	Within Groups	87,286	145	,602		
	Total	87,384	147			
AF5	Between Groups	,530	2	,265	,789	,456
	Within Groups	48,710	145	,336		
	Total	49,240	147			
AF6	Between Groups	1,912	2	,956	1,129	,326
	Within Groups	122,811	145	,847		
	Total	124,723	147			

CFA ATTENDANCE STATISTICS

As a result of T-test there is statistical significance between meeting attendents and non attendants in Factor 3. Factor 3 includes Method Sophistication items.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AF1	Equal variances assumed	3,935	,049	-,374	146	,709	-,04623	,12366	-,29063	,19817
	Equal variances not assumed			-,380	144,749	,705	-,04623	,12177	-,28691	,19445
AF2	Equal variances assumed	,001	,975	-1,875	146	,063	-,22406	,11950	-,46023	,01211
	Equal variances not assumed			-1,877	143,931	,063	-,22406	,11936	-,45999	,01188
AF3	Equal variances assumed	9,463	,003	-3,105	146	,002	-,32330	,10413	-,52910	-,11750
	Equal variances not assumed			-3,188	136,742	,002	-,32330	,10143	-,52387	-,12274
AF4	Equal variances assumed	1,075	,302	,618	146	,537	,07870	,12731	-,17291	,33031
	Equal variances not assumed			,620	144,714	,536	,07870	,12695	-,17221	,32961
AF5	Equal variances assumed	1,352	,247	-,770	146	,443	-,07349	,09550	-,26223	,11525
	Equal variances not assumed			-,775	145,761	,440	-,07349	,09488	-,26101	,11403
AF6	Equal variances assumed	,130	,719	-,837	146	,404	-,12713	,15193	-,42740	,17314
	Equal variances not assumed			-,840	144,971	,402	-,12713	,15140	-,42636	,17209

CFA MANAGER/NON-MANAGER STATISTICS

As a result of T-test there is statistical significance between managers and non managers in Factor 3. Factor 3 includes Method Sophistication items.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AF1	Equal variances assumed	,123	,726	-,240	146	,810	-,03691	,15350	-,34027	,26645
	Equal variances not assumed			-,245	46,048	,807	-,03691	,15050	-,33984	,26601
AF2	Equal variances assumed	,018	,893	,601	146	,549	,09002	,14988	-,20619	,38622
	Equal variances not assumed			,612	45,981	,544	,09002	,14711	-,20610	,38614
AF3	Equal variances assumed	1,642	,202	2,414	146	,017	,31582	,13083	,05726	,57438
	Equal variances not assumed			2,867	58,527	,006	,31582	,11014	,09538	,53625
AF4	Equal variances assumed	2,120	,148	-,602	146	,548	-,09510	,15799	-,40735	,21714
	Equal variances not assumed			-,697	55,925	,488	-,09510	,13638	-,36831	,17811
AF5	Equal variances assumed	,071	,790	,479	146	,633	,05684	,11865	-,17766	,29133
	Equal variances not assumed			,454	42,146	,652	,05684	,12523	-,19586	,30953
AF6	Equal variances assumed	,256	,614	,200	146	,842	,03785	,18896	-,33559	,41130
	Equal variances not assumed			,210	47,695	,835	,03785	,18050	-,32513	,40084

PCA GENDER STATISTICS

As a result of T-test there is no statistical significance between genders for individual factors.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
F1	Equal variances assumed	6,029	,015	-1,684	146	,094	-,21099	,12528	-,45859	,03661
	Equal variances not assumed			-1,823	136,619	,071	-,21099	,11574	-,43988	,01789
F2	Equal variances assumed	,362	,548	,195	146	,846	,02495	,12819	-,22840	,27831
	Equal variances not assumed			,197	115,414	,844	,02495	,12638	-,22538	,27529
F3	Equal variances assumed	,000	1,000	1,000	146	,319	,10845	,10845	-,10589	,32279
	Equal variances not assumed			1,007	112,867	,316	,10845	,10772	-,10497	,32187
F4	Equal variances assumed	2,050	,154	-,309	146	,758	-,02246	,07272	-,16619	,12127
	Equal variances not assumed			-,326	128,737	,745	-,02246	,06894	-,15886	,11395
F5	Equal variances assumed	,759	,385	-1,234	146	,219	-,12227	,09911	-,31816	,07361
	Equal variances not assumed			-1,189	98,770	,237	-,12227	,10283	-,32631	,08176
F6	Equal variances assumed	6,019	,015	-,372	146	,711	-,04400	,11832	-,27783	,18984
	Equal variances not assumed			-,397	132,934	,692	-,04400	,11069	-,26294	,17495

PCA ROLE STATISTICS

As a result of ANOVA there is no statistical significance between roles for individual factors.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
F1	Between Groups	,194	3	,065	,117	,950
	Within Groups	79,926	144	,555		
	Total	80,120	147			
F2	Between Groups	1,114	3	,371	,659	,579
	Within Groups	81,198	144	,564		
	Total	82,312	147			
F3	Between Groups	2,980	3	,993	2,540	,059
	Within Groups	56,319	144	,391		
	Total	59,299	147			
F4	Between Groups	,221	3	,074	,404	,750
	Within Groups	26,279	144	,182		
	Total	26,501	147			
F5	Between Groups	,335	3	,112	,326	,807
	Within Groups	49,367	144	,343		
	Total	49,702	147			
F6	Between Groups	1,431	3	,477	,999	,395
	Within Groups	68,733	144	,477		
	Total	70,164	147			

PCA STRUCTURE STATISTICS

As a result of ANOVA there is no statistical significance between structure for individual factors.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
F1	Between Groups	,194	3	,065	,117	,950
	Within Groups	79,926	144	,555		
	Total	80,120	147			
F2	Between Groups	1,114	3	,371	,659	,579
	Within Groups	81,198	144	,564		
	Total	82,312	147			
F3	Between Groups	2,980	3	,993	2,540	,059
	Within Groups	56,319	144	,391		
	Total	59,299	147			
F4	Between Groups	,221	3	,074	,404	,750
	Within Groups	26,279	144	,182		
	Total	26,501	147			
F5	Between Groups	,335	3	,112	,326	,807
	Within Groups	49,367	144	,343		
	Total	49,702	147			
F6	Between Groups	1,431	3	,477	,999	,395
	Within Groups	68,733	144	,477		
	Total	70,164	147			

PCA ATTENDANCE STATISTICS

As a result of T-test there is no statistical significance between meeting attendents and non attendants.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
F1	Equal variances assumed	1,762	,186	-,223	146	,824	-,02724	,12204	-,26844	,21396
	Equal variances not assumed			-,225	145,612	,823	-,02724	,12134	-,26707	,21258
F2	Equal variances assumed	3,935	,049	,374	146	,709	,04623	,12366	-,19817	,29063
	Equal variances not assumed			,380	144,749	,705	,04623	,12177	-,19445	,28691
F3	Equal variances assumed	3,285	,072	1,807	146	,073	,18772	,10386	-,01754	,39297
	Equal variances not assumed			1,836	144,558	,068	,18772	,10222	-,01433	,38976
F4	Equal variances assumed	,129	,720	1,029	146	,305	,07197	,06995	-,06627	,21022
	Equal variances not assumed			1,035	145,579	,303	,07197	,06956	-,06550	,20945
F5	Equal variances assumed	1,207	,274	,662	146	,509	,06354	,09600	-,12619	,25326
	Equal variances not assumed			,667	145,859	,506	,06354	,09531	-,12484	,25191
F6	Equal variances assumed	,010	,922	,954	146	,342	,10867	,11387	-,11639	,33372
	Equal variances not assumed			,954	143,150	,342	,10867	,11391	-,11650	,33383

PCA MANAGER/NON-MANAGER STATISTICS

As a result of T-test there is statistical significance between managers and non managers in Factor 3. Factor 3 includes both Information Usage and Method Sophistication items.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
F1	Equal variances assumed	3,758	,054	-,409	146	,683	-,06186	,15138	-,36105	,23732
	Equal variances not assumed			-,476	56,393	,636	-,06186	,13006	-,32237	,19864
F2	Equal variances assumed	,123	,726	-,240	146	,810	-,03691	,15350	-,34027	,26645
	Equal variances not assumed			-,245	46,048	,807	-,03691	,15050	-,33984	,26601
F3	Equal variances assumed	2,262	,135	2,719	146	,007	,34562	,12713	,09437	,59688
	Equal variances not assumed			3,117	54,939	,003	,34562	,11087	,12344	,56781
F4	Equal variances assumed	,003	,959	,366	146	,715	,03183	,08707	-,14026	,20391
	Equal variances not assumed			,361	44,202	,720	,03183	,08819	-,14588	,20954
F5	Equal variances assumed	,043	,836	,688	146	,493	,08192	,11911	-,15348	,31732
	Equal variances not assumed			,663	42,989	,511	,08192	,12351	-,16717	,33101
F6	Equal variances assumed	,001	,982	1,482	146	,141	,20847	,14069	-,06958	,48653
	Equal variances not assumed			1,483	44,964	,145	,20847	,14053	-,07458	,49153

PCA CORRELATION ANALYSIS

6 Factors(Maturity) and 2 Absorptive Capacity Factors are correlated to each other.

Correlations

			F1	F2	F3	F4	F5	F6	POF	ROF
Spearman's rho	F1	Correlation Coefficient	1,000	,230**	,280**	,375**	,346**	,387**	,463**	,287**
		Sig. (2-tailed)	.	,005	,001	,000	,000	,000	,000	,000
		N	148	148	148	148	148	148	148	148
	F2	Correlation Coefficient	,230**	1,000	,203*	,290**	,274**	,269**	,287**	,242**
		Sig. (2-tailed)	,005	.	,014	,000	,001	,001	,000	,003
		N	148	148	148	148	148	148	148	148
	F3	Correlation Coefficient	,280**	,203*	1,000	,249**	,218**	,204*	,483**	,287**
		Sig. (2-tailed)	,001	,014	.	,002	,008	,013	,000	,000
		N	148	148	148	148	148	148	148	148
	F4	Correlation Coefficient	,375**	,290**	,249**	1,000	,276**	,226**	,391**	,352**
		Sig. (2-tailed)	,000	,000	,002	.	,001	,006	,000	,000
		N	148	148	148	148	148	148	148	148
	F5	Correlation Coefficient	,346**	,274**	,218**	,276**	1,000	,338**	,298**	,253**
		Sig. (2-tailed)	,000	,001	,008	,001	.	,000	,000	,002
		N	148	148	148	148	148	148	148	148
	F6	Correlation Coefficient	,387**	,269**	,204*	,226**	,338**	1,000	,299**	,177*
		Sig. (2-tailed)	,000	,001	,013	,006	,000	.	,000	,031
		N	148	148	148	148	148	148	148	148
	POF	Correlation Coefficient	,463**	,287**	,483**	,391**	,298**	,299**	1,000	,391**
		Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	.	,000
		N	148	148	148	148	148	148	148	148
	ROF	Correlation Coefficient	,287**	,242**	,287**	,352**	,253**	,177*	,391**	1,000
		Sig. (2-tailed)	,000	,003	,000	,000	,002	,031	,000	.
		N	148	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX 2: Result of Evaluation by Ethics Committee

ETİK KURUL DEĞERLENDİRME SONUCU/RESULT OF EVALUATION BY THE ETHICS COMMITTEE

(Bu bölüm İstanbul Bilgi Üniversitesi İnsan Araştırmaları Etik Kurul tarafından doldurulacaktır /This section to be completed by the Committee on Ethics in research on Humans)

Başvuru Sahibi / Applicant: Okan Beşli

Proje Başlığı / Project Title: Using Corporate Foresight Activities to Enable Sense Capability as a Part of Organizational Agility

Proje No. / Project Number: 2019-20604-142

1.	Herhangi bir değişikliğe gerek yoktur / There is no need for revision	XX
2.	Ret/ Application Rejected Reddin gerekçesi / Reason for Rejection	

Değerlendirme Tarihi / Date of Evaluation: 9 Ekim 2019

Kurul Başkanı / Committee Chair

Doç. Dr. Itır Erhart

Üye / Committee Member

Prof. Dr. Aslı Tunç

Üye / Committee Member

Prof. Dr. Turgut Tarhanlı

Üye / Committee Member

Prof. Dr. Hale Bolak Boratav

Üye / Committee Member

Prof. Dr. Koray Akay