Developing a Research Model for the Effects of Organizational Structure's Agility, Team Autonomy, and Emerging Leadership in Teams on Agile Project Performance

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Abstract

In a world where there is constant change and market pressure, organizations have to evolve towards agile structures in order to ensure continuous development and remain competitive in a complex environment. Businesses have had to switch to a more flexible structure in order to get rid of inertia and increase efficiency. One of the most important elements of these flexible structures is self-organized teams consisting of interdisciplinary people with different functional expertise working for a common purpose. There is not much information and guidance in the literature on how to operate self-organization, how teams self-organize in practice, and how to measure agile project performance. On the other hand, it is observed that there are leaders who are not officially appointed but emerge informally in autonomous teams without leaders. Studies reveal that these informal leaders have positive effects on performance. In this study, a research model was introduced that explores the effects of organizational flexibility, team autonomy, and emerging leadership characteristics of team members on agile project performance. The research model has four main constructs with an organizational flexibility construct with variables organizational structure, openness to change, people-focused, and organizational creativity; the team autonomy construct with variables role distribution in the team, constructive feedback, trust, collaboration, and assigned manager; the emerging leadership construct with variables humility, influence, creative thinking, and adaptability; and finally, the dependent variable the Agile project performance construct with variables customer satisfaction, team perception, and triple constraint.

Keywords
Agile Project Performance, Self-Organized Team, Organizational Agility, Team Autonomy, Emerging Leadership

1. Introduction
Changing world conditions force organizations to be more flexible and agile. At the beginning of the 21 st century, software applications on various topics have entered business life at an exponential pace. This led to a more agile search for a journey to software projects where the final product was not identified, estimates were not kept, plans were constantly revised. This transformation has led organizations to transform their mechanical processing structures, such as clockwork, into more organic, living, adaptable and self-changing dynamic structures.

Transforming into self-organized teams which is one of the foundations of agile transformation, can create adaptation problems for teams accustomed to the hierarchical order. On the other hand, the lack of a defined leader in self-organized, autonomous teams does not prevent natural leaders from appearing within the team. These natural leaders, which have unofficially emerged in some sectors, such as software development, have a performance-enhancing effect (Przybilla et al., 2020) which seems reasonable due to their effective contribution to self-organization.

In this study, a qualitative research model was created with focus group work on the factors affecting organization flexibility, team autonomy and emerging leadership characteristics, agile project performance.

In the second part of the study, literature screening was presented on the emergence of the concept of agility, self-organized structures, emerging leadership, and project performance. The third section describes the studies, the model, and the constructs created. The results obtained in the last section are evaluated and recommendations are presented for further research.

1.1 Objectives

One of the most important issues in management, determined by academics and based on practical experience, is the volatile environment facing contemporary organizations. The ability of organizations to handle rapidly changing environments and unexpected events is an important topic in organizational and administrative research. Tu (2009) examines the fact that when a team encounters an environmental shock, they disrupt their current order and reestablish a new order through innovation and self-initiated changes. In this study, the team is a ship's crew with electrical problems as they approached a port.

The self-organized organization ensures fast results in situations that threaten vital functions, while in particular, the development team in enterprise companies should focus on the outcome with a similar self-organization motivation. Hoda et al. (2013) noted that self-organized teams, which have been a distinguishing feature of agile methods, have been at the heart of software engineering in the last decade, but have undergone research. In particular, the lack of research is drawn to how the agile teams are practically organizing themselves.

In contemporary teams, team members choose to combine their skills to achieve results instead of being assigned to work with each other. However, the team management literature written so far has focused either on teams assigned randomly or staffed. Research on how teams are created and how they should be created has shown that successful and failed teams are homogeneous to different characteristics and successful teams are established more often based on friendship than failed teams (Wax et al. 2017).

Magpili and Pazos (2017) have recommended that researchers investigate the appropriate balance between autonomy and organizational structure, and the determination of appropriate leadership approaches in various contextual conditions. In this context, a model will be established that determines the effects of organizational structure, team autonomy, and emerging leadership features on agile team performance.

2. Literature Review

2.1. Literature Review on The Need for Change in Organization Structures and The Emergence of Agility

In a world of constant change and market pressure, organizations have a very difficult time maintaining continuous development within a complex environment and staying in the competition. With the digital global economy evolving with the Internet, the brutal competitive environment created by increased customer power along with market transparency and personalization demands has led to unforeseen threats. (Pal and Pantaleo, 2005)

In the new economic models that have emerged from the advancements in technology, businesses have to change their structure to survive. For centuries, wars affecting humanity have influenced management styles and military-style hierarchical management structures as businesses are founded. The industrial revolutions, which started with the discovery of the steam machine, are strengthened by the introduction of electricity and computers into our lives, and businesses are organized as machines (Laloux, 2014) that are imagined functioning like clockwork.

It is based on creating a single model in 20th-century methods and approaches where competition is not so high, change needs are low, and producing it over and over again and for less. Frederick Taylor's Scientific Management

principles aimed at improving productivity by dividing employees in the organization into two fundamentally thinkers and makers. The separation of roles in this way and functional silos in the chain of command have been established, the distance between the manager and the manufacturer has increased, and individuals have started to be seen as "resources", and standardization and predictability-based organizations have emerged.

Research has started to be done on the need for change in the organization structure and the way it is managed today, where production environments are needed that can constantly change, produce and support new products. One of the pioneering studies on this topic is an article called "the All-New Product Development Game" written by Takeuchi and Nonaka in 1986.

Flexible companies are successful in the face of acceleration in business life. Businesses have become obligated to support this change due to sudden changes, unexpected developments, and uncertainties. Businesses have been forced to move on to a more flexible structure to get rid of inertia and improve efficiency. In businesses where the Lean Management philosophy is adopted and implemented, such as Toyota and Canon, tightly connected teams carry the ball back and forth as a team, behind the line, as in Rugby. The "flag race" model of product development must now be abandoned. These teams, called Cross-functional, are composed of people with different functional interdisciplinary expertise working for a common purpose. (Takeuchi and Nonaka, 1986)

In a report by the Iacocca Institute of Lehigh University, 5 years after Nonaka and Takeuchi's article explaining how US companies must move forward to become a production leader, the concept of "agile" for the ability of businesses to survive in a globally competitive environment of uncertainty has been used for the first time academically. The emerging new concept of manufacturing now emphasizes that instead of the paradigm driven by technology, the customer needs to be transited to the agile paradigm, where they are asked what they want (Nagel and Dove, 1991). However, this report did not mention how agility will be implemented within the organization, how an organizational structure should be established, and how projects will be handled agile.

Agile transformations have started to be experienced actors in the field of computer technologies in the 21st century. In the waterfall method proposed by Royce (1970), which was used extensively before this paradigm shift, the scope of the project is determined at the beginning of the project, the team determines what kind of design and development will be made to bring this scope to life, and carries out the project by putting the work to be done on a time plan. Schwaber and Sutherland (2020) stated that this method, especially software development projects resulted in 83% failure. In 1995, they introduced a management system called Scrum, in which ideas could be directed not only from the top-down but also from the bottom up, and adjusted in real-time. In parallel with the work of Schwaber and Sutherland, different agile methods have been developed, as shown in Table 1. The developers who developed these methods, together with the authors of the books and researches in Table 2, published a paper called Agile Software Manifesto consisting of four values in 2001.

Table 1 – Agile methods and their developers

Developer	Abbreviation	Agile Method Name	Year
James Martin	RAD	Rapid Application Development	1991
IBM	UP, RUP	Unified Process, Rational Unified Process	1994
DSDM Konsorsiyumu	DSDM	Dynamic Systems Development Method	1994
Ken Schwaber, Jeff Sutherland	Scrum	Scrum	1995
Alistar Cocburn	Crystal	Crystal Clear	1996
Kent Beck, Ward Cunningham, Ron Jeffries	XP	Extreme Programming	1996
Jeff De Luca, Peter Coad	FDD	Feature-Driven Development	1997
Martin Fowler	UML	Unified Markup Language	1997
Jim Highsmith	ASD	Adaptive Software Development	1999

Table 2 – Leading books and research in agility

Developer	Book/Research Name	Year
Stephen (Steve) Mellor	Object Oriented Systems Analysis: Modeling the World in Data	1988

Brian Marick	The Craft of Software Testing	1994
Robert C. Martin	Designing Object-Oriented C++ Applications Using the Booch Method	1995
Mike Beedle	SCRUM: An extension pattern language for hyperproductive software development	1995
Jon Kern	Enhanced fighter Agility	1995
David Thomas, Andrew Hunt	The Pragmatic Programmer	1999
Arie van Bennekum	Integrated Agile Transformation Model	2001
James Grenning	Planning Poker	2002

2.2. Literature Review on Self-organized, Autonomous Teams

One of the key proposals supported by agile structures is self-organized teams. However, regardless of the stages of the team formation that Tuckman has put forward, it is assumed that the agile team may be immediately organized and start working to produce the desired results due to the self-organization structure together with the establishment of the agile team. The individual characteristics of team members, especially when there is no leader, have not been explicitly discussed the impact of someone starting to take on this role. Similarly, the academic studies of the self-organization paradigm, in which roles are tried to be eliminated, were not found in the literature to prove its ruse and sit on a well-accepted structure, according to previous team-building paradigms. In particular, the literature did not include much information about how self-organization is going to be run in the software industry, and there is a serious lack of information about how their teams practically organize themselves. On the other hand, leaders who are not formally assigned to autonomous teams, but have unofficially emerged are observed. Research reveals that these unofficially emerging leaders have a positive impact on performance. This also seems reasonable due to its effective contribution to self-organization (Przybilla et al. 2020).

Tu (2009) explores the process by which a team disrupts its current order when facing an environmental shock and re-establishes a new order through innovation and changes initiated spontaneously by team members. The team examined in this study are ship crews who encounter an electrical problem while approaching a port.

While self-organization in situations that threaten vital functions can quickly lead to conclusions, the team developing software, particularly within a corporate firm, should focus on the outcome in a similar motivation for self-organization is an issue to be explored. Hoda et al (2013) indicated that over the past decade, self-organizing teams, which are the hallmarks of agile methods, have been central to software engineering, but little research has been done on the issue. In particular, he pointed out that there is a lack of research into how Agile teams organize themselves in practice.

2.3. Literature Review on Emerging Leadership

Contemporary teams are coming together on their own with increasing frequency, meaning team members are choosing to join forces to achieve the result rather than being assigned to work with each other. However, much of the team literature written to date has focused on teams randomly assigned or staffed. Research into how people make teams and how people should build teams has shown that successful and failed teams are homogeneous in terms of different characteristics, and successful teams are established based on friendship baseline more often than failed teams (Wax et al., 2017). Magpili and Pazos (2017) recommended investigating researchers the finding of appropriate balance between autonomy and organizational structure and identifying appropriate leadership approaches in various contextual conditions.

In recent neuroscience studies, it has been revealed that human beings cannot be only task-based productive as a social entity. The idea of the brain's reaction to fighting/running/freezing against a physical threat is widely accepted. But the idea that the brain reacts in the same way to social threats is relatively less familiar. According to neuroscience, the human brain reacts to the social threat as it is to the physical threat -- tries to avoid it. When deciding whether a situation is a threat, the brain relies on experience first of all. In response to the social threat, the brain produces feelings of avoidance (for example, fear, anxiety, anger, and shame). These avoidance feelings are ready to avoid the threat through avoidance behaviors. The person can be defensive, 'attacked' or retreated. In response, when the brain considers the situation 'safe', it produces feelings of approach, such as trust, excitement, joy, and love. These feelings

are also a prerequisite for successful project delivery. It enables approach behaviors such as collaboration, creative problem solving, and rational decision making. (Osterweil, 2020)

In particular, the literature did not include much information about how self-organization is going to be run in the software industry, and there is a serious lack of information about how their teams practically organize themselves. On the other hand, leaders who are not formally assigned to autonomous teams, but have unofficially emerged are observed. Research reveals that these unofficially emerging leaders have a positive impact on performance. This also seems reasonable due to its effective contribution to self-organization (Przybilla et al., 2020). Camcı and Örnek (2021) examined the leadership characteristics of agile teams in two dimensions as inherent and later learned features.

2.4. Literature Review on Project Performance

In the changing world, organizational structures are thought to have an impact on the performance of projects in the process of converting from a military order to living organisms as mentioned above, but not much has been included in the literature.

In the second half of the 20 st century, modern project management has tried to define success with the scope-time-cost triangle in organizations that function like machines. However, some projects are not considered successful even though they have completed the set scope in time and budget. For example, the Los Angeles Metro Project, which ends in time and budget, serves an average of 60 people (Stopher, 1993), while targeting 1 million passengers per day. On the other hand, the Sydney Opera House was targeted at a budget of $7 million and completed in 4 years. The project cost $102 million and was completed in 16 years (Hale and Macdonald, 2005). Is it acceptable to fail this project, which is positioned as the eighth wonder of the world, with millions of visitors each year making a huge profit?

On the other hand, the measurement of success in the agile methods that adopt the self-organized team structure is also tried to be quantitatively determined with speed (velocity) measurements over “Story Points” and “Burndown charts” (Schwaber and Shutterland, 2020), but there are no numerous studies on the social factors that affect agile project performance and success.

3. Research Model

Within this study, a qualitative method was used to create a model that determines factors that influence organizational flexibility, team autonomy and emerging leadership characteristics on agile project performance. The research to be done aims to be the answer to the open points in the topics that the former researchers have drawn attention to above.

the following model has been created by qualitative work with interviews with the 6-person research group. The research group includes 2 agile project managers, 2 scrum masters, 1 agile coach, and 1 agile project management consultant. The model created is provided in Figure 1. Three hypotheses have been identified in the model. The constructs in the model are described following section.

- H1: Organizational flexibility has a positive and significant impact on the performance of agile projects.
- H2: Team autonomy has a positive and significant impact on the performance of agile projects.
- H3: Emergingleadership has a positive and significant impact on the performance of agile projects.

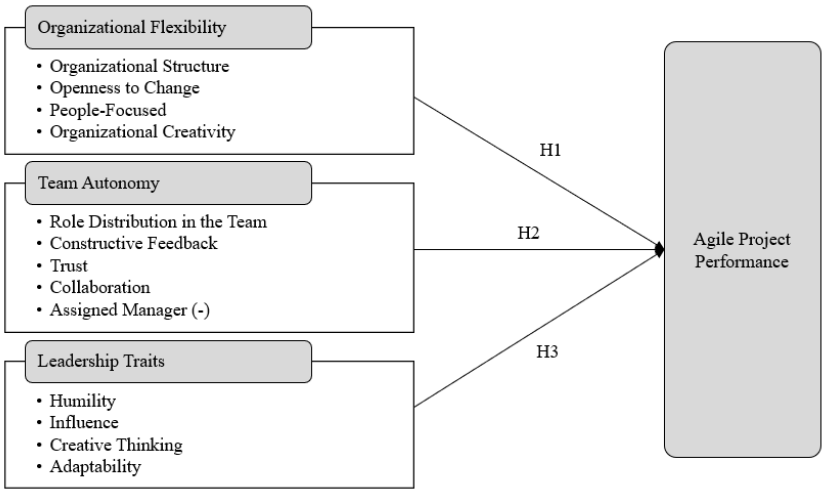

Figure 1 – Research model for factors that influence agile project performance

3.1. Construct 1: Organizational Flexibility

The first component addressed in the model created in this study was "Organizational Flexibility". The reason for choosing organizational flexibility instead of organizational agility is to examine the effect of agile project trials in non-agile organizations. The relationship between the degree of flexibility of the organization and autonomous team performance will be questioned. The variables that will take place under this component have been determined as follows in the literature review and interviews with experts in the focus group:

Organizational Structure: Reducing organizational hierarchy is to encourage the initiative to rationalize efforts by removing insignificant controls from employees (Çubukçu, 2018). At flexible companies, there is no strict chain of command control. In the face of change, self-organized teams are formed within the company. Some parts of the company have hierarchical structures, and some parts of the company have agile self-organized structures.

Openness to Change: In companies that are open to change, employees can apply change psychologically and behaviorally (Weiner et al. 2008:381). When the need for change in the structure of the company is revealed, management and employees are not resistant to it. Project Management processes evolve according to conditions.

People-Focused: Socializing opportunities created with personal awareness in people-focused companies increase employee loyalty (Bilge and Işık, 2007). In these companies, knowledge and experience are important, and initiative is encouraged. Managers help employees be clear about what is expected of them. Employees feel like they're part of the organization.

Organizational Creativity: Individuals working together in a complex social system produce valuable and useful new ideas, products, and services (Samen, 2008). The company can self-create new solutions for solving problems. Management supports employees to create creative solutions. Sentences such as "we've already tried this", "it will never work", "it's against company policy" or "the boss won't like it" are not heard in-house.

3.2. Construct 2: Team Autonomy

With the Agile manifesto published in 2001, a common agreement on values and principles was reached. However, in the intervening 20 years, the definition of success has still not been clarified, and it has been seen that it is not easy to achieve successful results when the nuance difference between applying agile methods and being agile is ignored. In the literature, there are not many studies on social factors that affect agile project performance and success.

One of the important propositions supported by agile structures is self-organized teams. In the literature, academic studies have not been found in the literature for the self-organization paradigm, in which the roles are tried to be eliminated in the team structure, to prove its coming of age compared to the previous team building paradigms and to settle in a structure that is accepted by everyone.

Therefore, Team Autonomy is considered the second component of the model. The variables that will take place under this component have been determined as follows in the literature review and interviews with experts:

Role distribution in the team: The person determines their role, does not need obedience or assignment (Tüz, 2001). Role distribution is not performed on the team, roles are owned by team members.

Constructive Feedback: Team members provide constructive feedback on the performance of other members (Rony et al., 2020)

Trust: Mutual trust within the team increases the contribution to success (Becerikli, 2013). There is mutual trust among the team members. (Moe et al, 2008)

Collaboration: Without a directive within the team, people collaborate by helping each other. (Gren et al., 2017)

Assigned Manager: Having an assigned manager on the team has a negative effect. Autonomous project teams do not require assigned managers. (Khanagha et al, 2021)

3.3. Construct 3: Emerging Leadership

Assigned leaders are employees who have an official leadership role in companies. In autonomous teams, a leader emerges because of the way other group members respond to them. Personality can play a big role in the person who appears to be the leader of a group.

Regardless of the stages of team formation that Tuckman put forward in self-organized team formations, it is assumed that with the establishment of the agile team, it can be organized and start working immediately to produce the desired results of its self-organization structure. The individual characteristics of the team members, especially in the absence of a leader, the effects of someone taking on this role naturally were not examined.

Emergency leadership doesn't just appear. It is often fed by communication and occurs over time. Therefore, the emerging leaders are straightforward, which allows others to recognize their contributions and to respect and like them. They gain the trust of other team members, which makes their performance better. They are also more predominant knowing that other team members have support and approval.

Emergency leaders don't decide on their instincts. They seek the opinion of the group members and develop innovative ideas together. This is very different from the top-to-bottom approach where leaders are appointed by the company management and what management approves is implemented without consulting team members.

The third component in the model is “Emerging Leadership”. The variables that will take place under this component have been determined as follows in the literature review and interviews with experts:

The skill set needed for the emerging leadership creates the variables of this construct. The ability to be an authority is not one of them. Because the person has proven himself to a group that approves. The skill variables discussed in this study are below.

Humility: The humble person has the opportunity to learn from their failures and mistakes. Humility allows someone else's success to be shared without jealousy. The emerging leader must be modest enough to work with other members. (Morris et al., 2005)

Influence: The emerging leaders have the ability to positively influence other team members. They are accepted and respected because of their influence on the team and their skills as leaders. This makes it easy for them to maintain trust as leaders. (Moe et al, 2008; Klonek et al, 2020; Tam et al, 2020)

Creative Thinking: Emerging leaders suggest new ideas for the group. They voluntarily lead the problem resolution. They offer solutions to help the team overcome challenges when completing a task. They're innovative. They're not afraid to take risks. (Joiner-Josephs, 2007)

Adaptability: One of the key characteristics of emerging leaders is their ability to adapt to any situation in the workplace. As part of the team, they have the ability to start leading the team with the changing situation. Emerging leaders recognize when a situation needs a different approach and lead others to use skill sets to move the project forward. An organization supporting emerging leaders encourages an environment in which adaptive methods are encouraged. (Joiner-Josephs, 2007; Tessem, 2014; Uhl-Bien and Arena, 2018)

3.4. Construct 4: Agile Project Performance

The factors used for agile project performance as the fourth component in the model are determined as follows in the literature screening and discussions with experts.

Customer Satisfaction: The customer is satisfied with the product. There is no significant difference in the value and quality created between what it wants and what it gets. The customer wants to work with this project team again on other projects. (Buresh, 2008)

Team Perception: Factors like autonomy, variety, significance, feedback, and ability to complete a whole task are significant factors to ensure satisfaction and motivation among workers. (Tessem and Maurer, 2007)

Triple Constraint: The first one represents how the project meets the customer's organizational or business goals and the latter represents an absolute measurement on how the project matches the traditional success criteria as expressed in the triple constraint (Veiga, 2017). Project objectives have been achieved during the prescribed time. Cost-effective compared to similar projects.

4. Results and Discussion

The proposed agility theories for the management of complexity systems such as software development and autonomous teams, one of the important pillars on which it is based, do not mention a leadership role. In the Complexity Leadership Theory presented in the study of Uhl-Bien and Arena (2018), it rejects the idea of a linear leadership process while saying that the agile leader makes change possible.

In this study, a consensus has been reached as a result of the literature review and focus group discussions on the fact that emerging leadership characteristics will affect team performances together with the flexibility of the organization and the autonomous structures of the teams. The research model has four main constructs with an organizational flexibility construct with variables organizational structure, openness to change, people-focused, and organizational creativity; the team autonomy construct with variables role distribution in the team, constructive feedback, trust, collaboration, and assigned manager; the emerging leadership construct with variables humility, influence, creative thinking, and adaptability; and finally, the dependent variable the Agile project performance construct with variables customer satisfaction, team perception, and triple constraint. Proposed research model using these constructs and variables is exhibited in Table 3.

Table 3 - Proposed research model with constructs and variables

Construct	Variables
Organizational Flexibility	Organizational Structure, Openness to Change, People-Focused, Organizational Creativity
Team Autonomy	Role Distribution in the Team, Constructive Feedback, Trust, Collaboration, Assigned Manager (-)
Emerging Leadership	Humility, Influence, Creative Thinking, Adaptability
Agile Project Performance	Customer Satisfaction, Team Perception, Triple Constraint

5. Conclusion

In this study, a conceptual model has been discovered, including factors that influence agile project performance. Following this qualitative study, a quantitative study is targeted. Firstly, survey questions will be prepared for construct and variables in the model with focus group study again. On the scale generated from these questions, explanatory and confirmatory factor analysis and validity and reliability analysis will be conducted. It is added to the model if hidden dimensions that cannot be observed or measured behind the features that can be measured and visible are

revealed. The survey to be created will be presented to agile project managers on software development projects in the financial sector. This is intended to verify the model that was introduced through a case.

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