

MIMAR SINAN FINE ARTS UNIVERSITY
★
INSTITUTE OF SCIENCE AND TECHNOLOGY

**ORGANIZATIONAL AND TEAM RESILIENCE IN THE CONSTRUCTION
INDUSTRY: EXPERIENCES FROM THE COVID-19 PANDEMIC**

GRADUATE THESIS BY

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**İNŞAAT SEKTÖRÜNDE ORGANİZASYON VE EKİP DAYANIKLILIĞI:
COVID-19 PANDEMİSİ DENEYİMLERİ**

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..... tarafından hazırlanan İNŞAAT SEKTÖRÜNDE ORGANİZASYON VE EKİP DAYANIKLIĞI: COVID-19 PANDEMİSİ DENEYİMLERİ adlı bu tezin Yüksek Lisans Tezi olarak uygun olduğunu onaylarım.

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- tez içindeki bütün bilgi ve belgeleri akademik kurallar çerçevesinde elde ettiğimi,
- görsel, işitsel ve yazılı tüm bilgi ve sonuçları bilimsel etik kurallarına uygun olarak sunduğumu,
- başkalarının eserlerinden yararlanılması durumunda ilgili eserlere bilimsel normlara uygun olarak atıfta bulunduğumu,
- atıfta bulunduğum eserlerin tümünü kaynak olarak gösterdiğimi,
- kullanılan verilerde herhangi bir değişiklik yapmadığımı,
- ücret karşılığı başka kişilere yazdırmadığımı (dikte etme dışında), uygulamalarımı yaptırmadığımı,
- ve bu tezin herhangi bir bölümünü bu üniversite veya başka bir üniversitede başka bir tez çalışması olarak sunmadığımı

beyan ederim.

....





To the world,



FOREWORD

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ORGANIZATIONAL AND TEAM RESILIENCE IN THE CONSTRUCTION INDUSTRY: EXPERIENCES FROM THE COVID-19 PANDEMIC

SUMMARY

One of the industries where teamwork is most commonly used is the construction industry. As one of the main differences from other industries, construction projects are unique every time and require project delivery at the location, resulting in forming project teams. Efficient results are expected from the teams throughout the project, still, the productivity of teamwork in the construction industry is lower than in other industries. Since the construction industry generally focuses on the iron triangle of time, cost, and quality, many other influential factors in the project can be ignored. Inefficiency and delays are repeated in almost every construction project due to reasons such as lack of communication and coordination, lack of trust and conflicts, and lack of focus and motivation in teams. Therefore, the difficulties encountered in teamwork in the sector should be investigated to respond to the inefficiencies and risks.

Due to its position in the world economy, the construction industry can be greatly affected by economic crises. In a competitive environment where risks are constant, being able to provide resilience in the face of these difficulties has become a necessity for the continuity of organizations. Resilience can be defined as the process of adapting positively and "bouncing back" from adverse situations. Organizational resilience, on the other hand, can be defined as the ability of business organizations to withstand challenging events and continue on their track in line with their future goals. Organizations are formed by many teams, and each team has its own strategic missions. As projects increase in complexity, they require more teamwork and the roles of teams in organizations increase. However, teams are built into organizations with their strengths and weaknesses, therefore, in order for organizations to develop resilience, resilience should be provided at the team level since teams are important elements of organizations. Team resilience can be defined as the capacity of the teams to withstand challenges, absorb them, and maintain a positive attitude. However, having a resilient capacity does not mean having a resilient ability. In other words, teams can have resilience as long as they can act together, otherwise, teams with resilient individuals may not be able to form resilient teams. Therefore, strategies that can help develop team resilience should be implemented.

The aim of this thesis research is to investigate team-level resilience strategies in order to increase the resilience of organizations by examining the challenges that occur in teamwork in the construction industry. In order to achieve this aim, three main objectives have been determined. These objectives: provide practical guidance to identify challenges in teamwork in the construction industry, identify strategies to develop team resilience, and support the process of building resilience with the experience gained during the Covid-19 pandemic.

In the first part of the thesis research, there is information about the purpose and method of the study, which are the issues that guide the determination of the subject. In the second part of the study, initially, a literature review was conducted about teamwork and teamwork difficulties experienced by the construction industry professionals in their institutions. In response to the first goal determined in the research, team challenges were identified as follows: overwork, communication, trust, delay, focus, conflict, and motivation. In the second part of the literature review, definitions and researches on resilience, organizational resilience, and team resilience has been done and strategies that can be used to increase team resilience have been determined. Strategies to develop team resilience, the second goal of the research, were identified as follows: maintaining positivity, adaptability, decision making, cooperation, problem-solving, well-being, time management, networking, and managing risks. Again, in the last part of the section, a literature review was conducted on the effect of the Covid-19 pandemic on the construction sector and the effects of the difficulties that may arise from the new working conditions applied in this period on teamwork. The team challenges experienced during the Covid-19 pandemic were identified as follows: workplace loneliness, disturbed life-work balance, reduces engagement towards work, lack of communication, lack of trust, lack of motivation, and overwork.

After the literature review, in the third part of the study, there is information about the basic approaches of the research, its design, and the data collection processes respectively. An online survey method was chosen to collect data and conveyed to the construction industry professionals as the target participants of the study (n=82). In the fourth part of the study, the analytical framework of the research was emphasized and the collected data were detailed by statistical analysis. Demographic characteristics were determined as per the data of the participants who formed the sample of the study. In this section, the relationships between the gender of the participants, their education levels, sectors, professions, roles in the institution they work, their professional experiences, in line with the difficulties they experienced in the team during the pandemic, the team resilience and difficulties they faced during the pandemic, and the attitudes of their institutions in this process were analyzed. The data of the study were first subjected to reliability analysis, and then the findings of the study were obtained by using descriptive and inferential analyses. Mann-Whitney U test and Kruskal-Wallis H test were used to determine statistically significant differences between non-parametric variables. In these analyzes, the independent variable is gender, education levels, and operational status during the pandemic; The dependent variables are 9 teamwork challenges, 15 resilience strategies, and 10 pandemic team challenges. In addition, Dunn's statistical test, which is the post-hoc test of Kruskal-Wallis H test, was applied for pairwise comparisons between each resilience strategy and teamwork challenges during the pandemic. The findings of the study, which emerged as a result of the analyzes in this section, are detailed in tables and interpreted in the fifth section. The fifth chapter, which is the last part of the study, includes a conclusion and discussions for the construction sector and future studies in line with all the research results and the obtained findings.



İNŞAAT ENDÜSTRİSİNDE ORGANİZASYON VE TAKIM DAYANIKLILIĞI: COVID-19 PANDEMİSİ DENEYİMLERİ

ÖZET

Takım çalışmalarının en yaygın kullanıldığı sektörlerden biri inşaat sektörüdür. İnşaat projeleri her seferinde benzersiz ve diğer endüstrilerden başlıca farklılığı olan proje lokasyonunda hizmet gerektirdikleri için bu kapsamda takımlar oluşturulur. Proje süreci boyunca takımlardan verimli sonuçlar beklenir ancak inşaat sektöründeki takım çalışmalarının verimliliği diğer sektörlerle kıyasla daha düşüktür. İnşaat sektörü genellikle zaman, maliyet ve kalite üçgenine odaklandığı için proje sürecinde etkili birçok diğer faktör gözardı edilebilmektedir. Proje takımlarındaki bireyler, belki de daha önceden hiç tanışmamış olan sektör profesyonelleri, kısıtlı zaman aralığında tanışarak birbirleriyle takım çalışması yapmaları sırasında zorluklar yaşayabilirler. Takımlarda meydana gelen iletişim ve koordinasyon yetersizlikleri, güvensizlik ve çatışmalar, dikkat ve motivasyon eksikliği gibi sebeplerden dolayı verimsizlik ve dolayısıyla gecikmeler neredeyse her inşaat projesinde tekrarlanmaktadır. Bu nedenle sektördeki takım çalışmasında karşılaşılan zorluklar, oluşan verimsizliklere ve risklere yanıt verebilme açısından araştırılmalıdır.

İNŞAAT sektörü dünya ekonomisindeki yeri dolayısıyla ekonomik krizlerden büyük ölçüde etkilenebilmektedir. Risklerin devamlı olduğu rekabetçi çevrede ise bu zorluklar karşısında dayanıklılık gösterebilmek organizasyonların devamlılığı için bir gereklilik haline gelmiştir. Dayanıklılık, zorlu durumlar karşısında uyum sağlama ve "geri dönme" süreci olarak tanımlanabilir. Organizasyonel dayanıklılık ise kurumların zorlu olaylara karşı koyabilme ve gelecek hedefleri doğrultusundaki rotasına devam edebilmeleri olarak tanımlanabilir. Organizasyonlar birçok takımdan meydana gelir ve herbir takımın kendi stratejik görevleri vardır. Projelerin karmaşıklık dereceleri arttıkça daha çok takım çalışması gerektirirler ve takımların organizasyonlardaki rolleri daha da artar. Ancak, takımlar güçlü ve zayıf yönleri ile organizasyonlara dahil edilmiştir, bu nedenle organizasyonların dayanıklılık geliştirebilmeleri için önemli yapıtaşları olan takımları seviyelerinde dayanıklılık sağlanmalıdır. Takım dayanıklılığı, takımların zorlu sürece karşı koyabilme, zorlukları absorbe etme ve pozitif tutumunu sürdürebilme kapasitesi olarak tanımlanabilir. Ancak, bir dayanıklılık kapasitesine sahip olmak, bir dayanıklılık yeteneğine sahip olmak anlamına gelmez. Başka bir deyişle, takımlar birlikte hareket edebildiği sürece dayanıklılık gösterebilir, aksi takdirde dayanıklı bireyler içeren takımlar dayanıklı takımlar oluşturamayabilir. Bu nedenle, takımların dayanıklılığı geliştirebilmek için uygulanabilecek stratejilerden yararlanılmalıdır.

Bu tez araştırmasının amacı, inşaat endüstrisindeki takım çalışmalarında meydana gelen zorlukları inceleyerek organizasyonların dayanıklılığını artırabilmek için takım düzeyinde dayanıklılık stratejilerini araştırmaktır. Bu amaca ulaşmak için üç temel hedef belirlenmiştir. Bu hedefler: inşaat sektörü takım çalışmalarında meydana gelen zorlukları belirlemek, takım dayanıklılığı geliştirebilmek için stratejiler belirlemek ve

Covid-19 pandemisi sürecinde elde edilen takım çalışmaları deneyimleriyle dayanıklılık geliştirebilme sürecini desteklemek için pratik rehber sunmaktadır.

Tez araştırmasının ilk bölümünde, konunun belirlenmesine yön veren hususlar olan çalışmanın amacı ve yöntemi hakkında bilgiler yer almaktadır. Çalışmanın ikinci bölümünde ilk olarak literatür çalışması yapılarak takım çalışmaları ve inşaat sektörü profesyonellerinin kurumlarında deneyimlediği takım çalışması zorlukları tanımlanmıştır. Araştırmada belirlenen birinci hedefe cevap verecek şekilde takım zorlukları şu şekilde belirlenmiştir: fazla çalışma, iletişim, güven, gecikme, odaklanma, çatışma ve motivasyon. Literatür taramasının ikinci bölümünde dayanıklılık, organizasyonel dayanıklılık ve takım dayanıklılığı ile ilgili tanımlamalar ve araştırmalar yapılarak takım dayanıklılığını artırmak için kullanılabilir stratejiler belirlenmiştir. Araştırmanın ikinci hedefi olan takım dayanıklılığını geliştirmeye yönelik stratejiler şu şekilde belirlenmiştir: olumlu tutumu sürdürme, adapte olabilme, karar verme, işbirliği, problem çözme, esenlik, zaman yönetimi, ağ oluşturma ve riskleri yönetme. Literatür çalışmasının son bölümünde araştırmanın üçüncü hedefi olan, pandemi sürecinin inşaat sektörüne olan etkisi ve bu süreçte uygulanan yeni çalışma şartlarından kaynaklı oluşabilecek zorlukların takım çalışmasına olan etkisi üzerine literatür çalışması yapılmıştır. Covid-19 pandemisi sürecinde deneyimlenen takım zorlukları şu şekilde belirlenmiştir: işyeri yalnızlığı, iş-yaşam dengesinin bozulması, işe karşı azalan bağlılık, iletişim eksikliği, güven eksikliği, motivasyon eksikliği ve fazla çalışma.

Literatür taramasından sonra, çalışmanın üçüncü bölümünde araştırmanın temel yaklaşımları, tasarımı ve veri toplama süreçleri hakkında ayrı ayrı bilgiler yer almaktadır. Veri toplamak için anket yöntemi seçilmiştir ve çalışmanın hedef kitlesi olarak inşaat sektörü profesyonellerine iletilmiştir (n=82). Çalışmanın dördüncü bölümünde ise araştırmanın analizsel çerçevesi üzerinde durulmuştur ve toplanan veriler araştırmanın hedeflerine ulaşabilmek için istatistiksel analiz edilerek detaylandırılmıştır. Çalışmanın örneklemini oluşturan katılımcıların verileri doğrultusunda demografik özellikler tespit edilmiştir. Bu bölümde katılımcıların cinsiyeti, eğitim seviyeleri, sektörleri, meslekleri, çalıştıkları kurumdaki rolleri, mesleki deneyimleri, pandemi sürecindeki çalışma şartları doğrultusunda takım içersinde deneyimledikleri zorluklar, pandemi sürecinde gösterdikleri takım dayanıklılıkları ve karşılaştıkları zorluklar ve kurumlarının bu süreçteki tutumları arasındaki ilişkiler incelenmiştir. Çalışmanın verileri öncelikle güvenilirlik analizine tabi tutulmuş, sonrasında tanımlayıcı ve çıkarımsal analizler kullanılarak çalışma bulguları elde edilmiştir. Parametrik olmayan değişkenler arasındaki istatistiksel açıdan anlamlı farklılıkları belirlemek için Mann-Whitney U testi ve Kruskal-Wallis H testi uygulanmıştır. Bu analizlerde bağımsız değişken cinsiyet, eğitim seviyeleri ve pandemi sürecindeki çalışma şartları iken; bağımlı değişkenler ise 9 takım çalışması zorlukları, 15 dayanıklılık stratejisi ve 10 pandemi sürecindeki takım zorluklarıdır. Ayrıca, her bir dayanıklılık stratejisi ve pandemi dönemindeki takım çalışması zorlukları arasındaki ikili karşılaştırmaları için Kruskal-Wallis H testinin post-hoc testi olan Dunn's istatistiksel testi uygulanmıştır. Bu bölümdeki analizler sonucu ortaya çıkan çalışma bulguları çizelgeler halinde detaylandırılarak beşinci bölümde yorumlanmıştır. Çalışmanın son bölümü olan beşinci bölümde tüm araştırma sonuçları ile elde edilen bulgular doğrultusunda inşaat sektörü ve gelecek çalışmalar için öneriler ve tartışmalar yer almaktadır.

Yapılan analizler ışığında ortaya çıkan sonuçlar şu şekilde özetlenmektedir. İnşaat sektöründeki takım çalışmaları zorluklarından “takım bireyleriyle yaşanan çatışmalar” ve “çalışma saatlerinin belirsizliği” en az etkiye sahip zorluklar olurken, “iletişim sorunları” ve “işlerin ertelenmesi” en fazla etkiye sahip zorluklardır. Takım dayanıklılığını artırıcı stratejilerden “fiziksel esenlik” ve “sosyal esenlik” en az etkiye sahip stratejiler olurken, “adapte olabilmek” ve “diğer bireylere yardımda bulunma” stratejileri en fazla etkiye sahiptir. Pandemi sürecinde deneyimlenen takım çalışması zorluklarından “takım bireyleriyle yaşanan çatışmalar” ve “güven sorunları” en az etkiye sahip zorluklar olurken, “iş-yaşam dengesinin bozulması” ve “fazla çalışma” en fazla etkiye sahip zorluklardır. Takım zorluklarından “iletişim”, “odaklanma” ve “çatışma” faktörleri ile cinsiyet arasında anlamlı düzeyde farklılık görülmüştür ve kadın çalışanların bu faktörler karşısında erkeklere kıyasla daha çok etkilendiği görülmüştür. Takım dayanıklılığını geliştirme stratejilerinden “diğer bireylere yardımda bulunma” ile cinsiyet arasında anlamlı düzeyde farklılık görülmüştür ve kadın çalışanların erkeklere kıyasla bu stratejide daha çok dayanıklılık sergilediği görülmüştür. Pandemi sürecindeki takım zorluklarından “işyeri yalnızlığı”, “iletişim eksikliği”, “iş-yaşam dengesinin bozulması”, “güven eksikliği”, “erteleme”, “odaklanma”, “çatışma” ve “motivasyon” faktörleri ile cinsiyet arasında anlamlı düzeyde farklılık görülmüştür ve kadın çalışanların bu faktörler karşısında erkeklere kıyasla daha çok etkilendiği görülmüştür. Takım zorluklarından “odaklanma” ve “çatışma” faktörleri ile eğitim seviyeleri arasında anlamlı düzeyde farklılık görülmüştür ve lisansüstü eğitim düzeyindeki çalışanların lisans düzeyindeki çalışanlara kıyasla daha çok etkilendiği görülmüştür. Takım dayanıklılığını geliştirme stratejilerinden “olumlu tutumu sürdürme”, “kendini yönetebilme” ve “fiziksel esenlik” ile eğitim seviyeleri arasında anlamlı düzeyde farklılık görülmüştür ve “olumlu tutumu sürdürme” ve “kendini yönetebilme” faktörleri karşısında lisansüstü eğitim düzeyindeki çalışanların lisans düzeyindeki çalışanlara kıyasla daha çok dayanıklılık sergilediği görülürken “fiziksel esenlik” faktöründe ise lisans düzeyindeki çalışanların lisansüstü eğitim düzeyindeki çalışanlara kıyasla daha çok dayanıklılık sergilediği görülmüştür. Pandemi sürecindeki takım zorluklarından “iletişim eksikliği”, “güven eksikliği”, “odaklanma”, “işe karşı azalan bağlılık” ve “motivasyon” faktörleri ile eğitim seviyeleri arasında anlamlı düzeyde farklılık görülmüştür ve lisansüstü eğitim düzeyindeki çalışanların lisans düzeyindeki çalışanlara kıyasla daha çok etkilendiği görülmüştür. Pandemi sürecindeki takım zorluklarından “iletişim eksikliği”, “erteleme” ve “motivasyon” faktörleri ile çalışma lokasyonu arasında anlamlı düzeyde farklılık görülmüştür ve bu faktörlerden yurtiçinde çalışan profesyonellerin yurtdışında çalışanlara kıyasla daha çok etkilendiği görülmüştür. Pandemi sürecindeki takım zorluklarından “zaman baskısı”, “işyeri yalnızlığı”, “iletişim sorunları”, “iş-yaşam dengesinin bozulması”, “odaklanma” ve “motivasyon” ile bu süreçteki çalışma şartları arasında anlamlı düzeyde farklılık görülmüştür. Sahada ve ofiste çalışanların hibrit olarak çalışanlara kıyasla daha fazla “zaman baskısı” deneyimlemiştir. Uzaktan ve hibrit olarak çalışanlar sahada ve ofiste çalışanlara kıyasla daha fazla “işyeri yalnızlığı” deneyimlemiştir. Uzaktan ve hibrit olarak çalışanlar sahada ve ofiste çalışanlara kıyasla daha fazla “işyeri yalnızlığı”, “iletişim sorunları”, “iş-yaşam dengesinin bozulması”, “odaklanma” ve “motivasyon” zorlukları deneyimlemiştir. Takım dayanıklılığını geliştirme stratejileri ile pandemi sürecindeki takım zorlukları arasında korelasyon analizine göre “işbirliği” ile “iş-yaşam dengesinin bozulması”, “adapte olabilmek” ile “işe karşı azalan bağlılık”, “olumlu tutumu sürdürme” ile “çatışma”, “işe karşı azalan bağlılık” ve

“motivasyon”, “destek görme” ile “çatışma”, “diğer bireylere destekte bulunma” ile “işyeri yalnızlığı” ve “iletişim”, “geri dönme” ve “kendini yönetebilme” ile “işe karşı azalan bağlılık” ve “motivasyon”, “sosyal esenlik” ile “motivasyon”, “fiziksel esenlik” ile “fazla çalışma” ve “motivasyon”, “ruhsal esenlik” ile “işyeri yalnızlığı”, “fazla çalışma”, “işe karşı azalan bağlılık” ve “motivasyon” arasında anlamlı düzeyde korelasyon görülmüştür. Bu bağlamda deneyimlenen zorluklar korelasyon görülen dayanıklılık stratejilerinin geliştirilmesini gerektirmektedir.

Sonuç olarak, inşaat sektörü çalışanlarının pandemi sürecinde deneyimlediği takım çalışması zorlukları ile takım dayanıklılığı faktörleri arasında istatistiksel olarak anlamlı ilişkiler bulunmuştur. Bu bulgular doğrultusunda takım dayanıklılığının geliştirilmesi için kullanılacak stratejilerden faydalanılabilmektedir. Ayrıca, bu çalışma sektördeki zaman, maliyet ve kalite üçgeninin ötesinde düşünmeyi teşvik ederek insan tarafının önemine vurgu yapmaktadır. Bu tez çalışması, yapım profesyonellerinin sektördeki takım çalışması ve dayanıklılıklarına odaklanmıştır. Gelecekteki çalışmalarda bu araştırmadaki yaklaşımlar kullanılarak, diğer endüstrilerdeki profesyoneller bağlamında incelenebilir.



1. INTRODUCTION

It is not new for people to work together as a group to increase their odds of survival. Teams consist of individuals who are interconnected and have common goals (Salas et al., 2015). As the complexity of the work increases, utilizing teams in most sectors is becoming widespread. Teams provide more potential in the face of complexity, both by enabling efficiency and creativity for organizations and by dividing responsibility and decision-making among their members (Conti & Kleiner, 1997). Teamwork reduces the need for coordination and simplifies the organizational structure. Moreover, teamwork can improve productivity and lead to lower costs over time. Team members can share experiences and knowledge with each other as a learning opportunity, which can increase the team's overall creativity. However, not every industry may have effective teamwork due to its own obstacles since efficient teamwork depends on management structure, leadership styles, and organizational flexibility (Tarricone & Luca, 2002). Teamwork efficiency in the construction industry is not high as the productivity in the effort put into the construction industry and the resulting product value is low. The construction industry mainly focuses on technical skills such as the iron triangle of time, cost, and quality to achieve project success. Moreover, the social skills in teamwork and resilience are neglected in the project success because the projects heavily focus on the factors such as low bid prices, which creates fragmented teams and results in poor team performance in the industry. Due to the nature of the industry, construction project teams are usually assembled at the project location, sometimes with local individuals, for a certain amount of time. Teaming up people who may have never met before and putting project responsibilities on the team can be problematic and come with challenges. Projects are becoming more and more complex and challenging, requiring the ability to deal with challenges at the individual, team, and organizational levels (Varajao et al., 2020). In recent years, a lot of research has been done on resilience in management and business. One of the meanings of resilience is the ability of the system back to its original state (or to adjust itself to the new state according to the

new situational demand) from an adverse event (Xue et al., 2018). Although some researchers argue that resilience is a process that ultimately leads to resilient results, it is the process of how organizations react when facing adversities to achieve resilient results (Hillmann & Guenther, 2021). Organizational resilience includes the organization's ability to face adversities, maintain its sustainability, and move forward on track with its future goals (Bui et al., 2019). However, construction projects are open to being affected by external factors, have uncertainties, and the risk is high, which makes them complex. Therefore, construction organizations need to be resilient in order to provide stability and survive in a competitive environment. Since organizations have been structured more team-based lately, resilience has become a team-level concept rather than being an individual-level capacity. Moreover, teams are implemented in organizations with their strengths as well as their weaknesses, thus team resilience can affect organizational resilience. In order to achieve organizational resilience, its teams as units can be investigated by focusing on team resilience and on strategies to develop team resilience.

Organizations operate in a dynamic environment, yet, with the development of technology, the global economy is now inevitably more volatile, uncertain, complex, and competitive. Internal and external factors such as weather, geopolitics, pandemic outbreaks, scientific and technological innovation, and other non-human factors lead to “black swan” and “grey rhino” incidents more frequently and affected global business (Liang & Cao, 2021). Most recently, the sudden outbreak of the Covid-19 pandemic has affected the global economy more than any other crisis in the history of mankind.

Apart from concerning health issues, the Covid-19 pandemic forced lockdown all over the world, which caused economic shutdowns and heavy losses. Since the construction sector was interdependent with many sectors both directly and indirectly, the industry has been one of the sectors most affected by the pandemic. Global restrictions caused supply chain issues, delays in activities, revenue losses, increased cost of construction outputs, contractual issues, and many other issues (Assaad & El-adaway, 2021). Therefore, the industry had to absorb these financial shocks just like every other business. However, while other sectors can develop innovations with modern managerial methods after the crises, the construction sector lags these developments. Remote teams have been used in many sectors for years, but the Covid-19 pandemic has globally required organizations to adopt them for

self-isolation purposes. Therefore, the development of remote collaboration has made teamwork in the construction industry more complex.

The construction industry suffers from tight timeframes, task complexities, poor working environments, complex business relationships, poor teamwork, and other factors. In this context, it is hoped that this study will increase awareness of the subject by revealing the importance of effective teamwork and developing organizational and team resilience in the industry.

1.1 Aim of the Study

As one of the most important drivers of the world economy, the construction industry lacks organizational resilience against crisis and lacks productive teamwork. In this context, focusing on team resilience plays an important role in the success of the organization. This study aims to examine resilience capabilities in the construction industry, both by identifying the challenges of teamwork and identifying other challenges faced during the Covid-19 pandemic era, to create more resilient teams and organizations. The results of the study are expected to provide valuable information to those interested in organizational resilience in the construction sector.

1.2 Method of the Study

The methodology designed to address the purpose of the thesis research is illustrated in Figure 1.1.

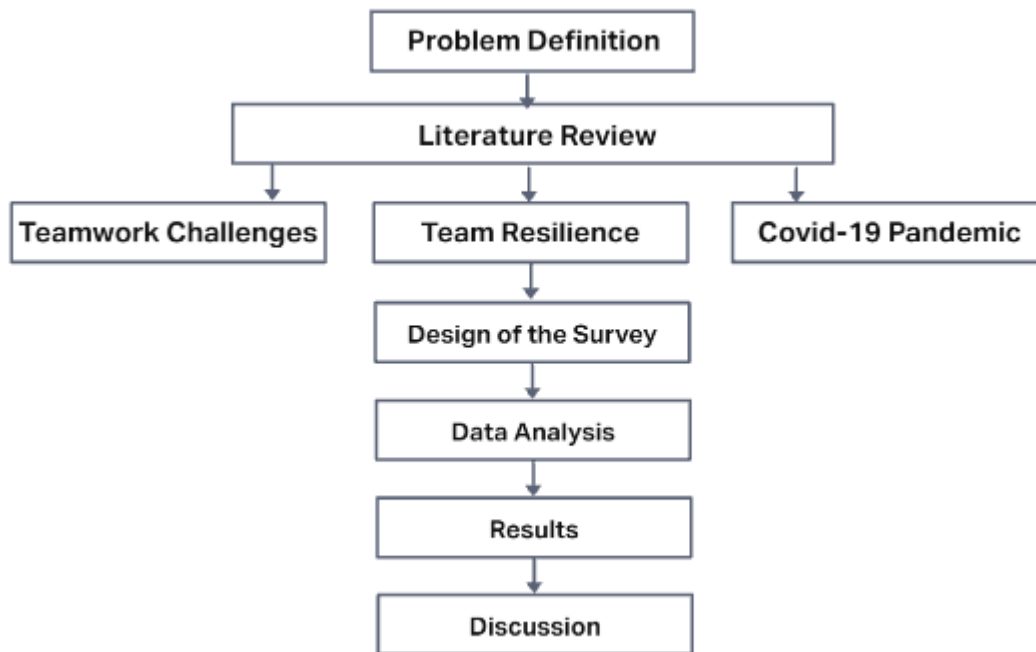


Figure 1.1 The stages of Reseach Methodology

In order to achieve the aim of the study, the research method is as follows;

- Literature review on teamwork and teamwork challenges in the construction industry,
- Literature review on organizational and team resilience and strategies for how to develop team resilience,
- Literature review on the Covid-19 pandemic and how it affected teamwork in the industry,
- A questionnaire survey with construction industry professionals,
- Analysis of data obtained from the questionnaire, by using the SPSS program,
- Presentation of the result of the SPSS program.

2. LITERATURE REVIEW

The literature review is examined under three headings: Teamwork, Resilience, and Teamwork Challenges in the Covid-19 Pandemic Era. In the Teamwork section, the role of teams in organizations and teamwork challenge factors in the construction industry are investigated. In the Resilience section, what organizational and team resilience is and how team resilience can be developed in organizations are investigated, and nine strategies to develop team resilience are determined. In the Pandemic section, the background of the Covid-19 pandemic, how it affected the construction industry and teamwork, and the teamwork challenges during the pandemic era were examined.

2.1 Teamwork

The word team refers to "people working together as a group in order to achieve something" (Cambridge Online Dictionary, 2021). There are many activities that people cannot perform alone such as playing tennis, performing a duet, or dancing (Cohen & Levesque, 1991). Rather than doing everything alone oneself, becoming a group or team to improve survival chances in nature is not new. The primary components of teams can be multiple individuals, interdependencies, and a common objective (Salas et al., 2015). Teams of individuals have been started to form when the tasks' complexity of businesses can no longer be completed successfully by individuals alone (Salas et al., 2005). With the development of team-based structures in the last decades, the variety of team-working forms increased in both the public and the private sectors - especially in production and service organizations (Richter et al., 2011). Teams not only provide more potential for adaptability, productivity, and creativity than one individual can offer, but they also provide shared responsibility for decision-making. Therefore, teams have significant roles in the success of organizations in a global, changing, and client-based economy (Piña et al., 2008).

Including employees in teams benefits both the organization and the employees themselves since teamwork increases individual productivity and brings more resilience to the business (Conti & Kleiner, 1997). One of the benefits that teams can provide is their ability to sustain adaptability and flexibility since teams can maintain their function even under an overload of team members (Salas et al., 2000). With teamwork, businesses can adapt to dynamic environments and be more responsive. An appropriate human resources system that includes teamwork has a positive effect on employee job satisfaction, commitment to the organization, and motivation to work (Delarue et al. 2008). Employees can feel attached more towards their work teams than the organization itself. In addition, working in teams also fulfills some of the social needs of employees, such as the need for social interaction and involvement (Riketta & Van Dick, 2005).

As complexities increased in the business world, the solutions also become more complex. Teams have helped businesses move forward by overcoming complexities through their higher problem-solving. Since teams include several individuals and their combined skills, experiences, judgments, and therefore, more efficient creativity, teams are more likely to achieve better results in organizations (Conti & Kleiner, 1997). Utilizing teams increased the focus on efficient team performance and what improves or reduces the efficiency of teams because teams include not only taskwork but also require teamwork (Piña et al., 2008; Salas et al., 2005). As much as teamwork is described as the combined action of a group of people, teamwork's dependency on the individual skills of members' sharing responsibility can be seen as a paradox (Tripathy, 2018). However, if teamwork is inadequate, members with experience in tasks are also vulnerable to poor team performance (Salas et al., 2015). Since both taskwork and teamwork can affect each other, they have a significant impact on team performance. While task work often becomes the focus for teams while working towards goals, teamwork ensures that task work is carried out effectively (Salas et al., 2015).

Teams work in complicated environments that require adaptation, so team members should be able to share information and resources dynamically through communication (Salas et al., 2000). Team communication, collaboration, and cohesiveness have an impact on team performance - especially communication plays a critical role in teams since it can coordinate the team members and make team more efficient (Yang et al., 2011). In fact, especially projects with higher

complexities, larger projects, and international projects require a higher level of team communication to achieve collaboration and success (Tripathy, 2018). Through open communication, individuals in teams come up with ideas and share their knowledge, experience, skills, talents, and abilities. In a team environment, members can observe other members provide and accept constructive feedback as a part of mutual performance monitoring. Therefore, a team's situational awareness of each other can be beneficial for effective teamwork (Salas et al., 2000). Thus, the team can provide learning opportunities from other members and a chance to boost the team's creativity.

While there are many benefits of utilizing teams in the organization, teamwork does not come risk-free and some challenges can be seen in the functioning of teams. Not having enough support and commitment from senior management, not having a clear vision or goals for teams, and team members not finishing their part of work on time can be a few challenges that are widely recognized (Drew & Coulson-Thomas, 1996). However, each organization in each industry may have its own barriers to cause insufficient teamwork. Having efficient teamwork is highly dependent on structures of management, styles of leadership, and organizational flexibility (Tarricone & Luca, 2002). Therefore, executives can determine what prevents effective teamwork within their business. On the other hand, project teams exist to be assembled to finish a specific project within a specific time. These teams are dependent on their members' interpersonal relationships, such as trust, on how to work together (Buvik & Rolfsen, 2015). Utilizing project teams can mostly be seen in the construction industry since construction projects are complicated and one-of-a-kind and more importantly, these projects are mostly undertaken at the delivery point. A construction's project stages are important, not only defined in the contract but to form the team and define its goals and responsibilities. A construction project basically has 6 main stages: project briefing, designing, specifying, tendering, constructing, and maintaining (Azmy, 2012). Therefore, team members in the construction projects may have different goals and objectives, still, they have to work together interdependently to deliver the project well (Aapaoja et al., 2013).

2.1.1 Teamwork Challenges in Construction Industry

Utilizing teamwork in construction project management is not new (Azmy, 2012). One of the earliest large-scale teamwork can be seen in the building of pyramids. The

team and teamwork concept has been concerning management in all industries, construction included. Many construction projects need properly coordinated teams to perform sufficiently. For instance, over the last couple of decades, the majority of the construction industry in the United Kingdom has been reported causing low performance because of not having integrated teamwork (Kumaraswamy et al., 2005). Construction teams usually look for opportunities to complete the project within the named budget. Therefore, due to uncertainties and changes over the project, completing the project within the budget can be challenging for the project team. Thus, the need for more effective teamwork becomes more critical, especially for construction industry performance. However, there are many challenges that prevent teamwork in the industry, such as a lack of trust and respect among project team members for the duration of the project (Loosemore, 2003). Construction project teams can be assembled from other divisions of the organization or even from an outside one and the team members have to work together for the project (Azmy, 2012).

According to Loosemore (2003), members of an average construction project include the client, project manager, financier, legal consultant, design leader (architect or structural engineer), other design consultants, main contractor, subcontractor (if project needs), and an end-user of the completed project. Generally, construction project teams consist of the owner, project manager, architects and engineers, as well as contractors and subcontractors (Azmy, 2012). Moreover, the procurement executions in the construction industry heavily focus on low bid prices, which is one of the main factors resulting in creating fragmented teams. Thus, the productivity and quality of teamwork in the construction industry are lower compared to other industries (Aapaoja et al., 2013). Therefore, this thesis research focuses on teamwork challenges in the construction industry. In this context, the challenges are examined as follows: overwork, communication, trust, delay, focus, conflict, and motivation.

Overwork

In teamwork, it is important that every member contributes to the team in terms of experiences and knowledge about team tasks. Since, in some teams, there may be members from different fields and expertise such as marketing, finance, design, etc., it is critical for teams to contribute through different tasks (Baiden & Price, 2011). Moreover, it is important that team has the harmony and synchronization while members individual contributions (Hoegl & Gemuenden, 2001). For the efficiency of

the team, members need to set common work-down schedules to eliminate unbalanced tasks such as overlaps, overwork, and gaps (Hoegl & Gemuenden, 2001). For instance, members can have their own schedule to focus on specific tasks without interruptions to prevent employees from experiencing overworked or disconnected from the team (Mitchell & Brewer, 2021). Therefore, clear team goals and coordination of members can be achieved.

Communication

Communication is considered to play a powerful role in the function and coordination of teamwork (Bui et al., 2019). Moreover, it can be the main driver of the efficient performance of the team with different areas of expertise since it provides knowledge sharing and information exchange in teams and organizations (Baiden & Price, 2011). However, providing the right information to the right member at the right time or the frequency of communication can be challenging since it can also lead to disagreements (Bui et al., 2019). In the construction sector, exchanging misleading communication between project team members related design drawings, reports, and work orders may lead to extra workloads, misunderstandings, or even conflicts (Cheung et al., 2013). For instance, in construction project teams, attitudes and conflicts can be caused by miscommunication toward a common vision, especially at the early stages of the project (Baiden & Price, 2011). The amount of communication is also important as excessive frequency of it can reduce the team performance while a low frequency of it may provide effective functioning of the team (Kratzer, 2001). Therefore, precise communication also helps the trust development in teams.

Trust

Trust can be defined as the faith that another part will perform a beneficial action, or at least not harmful, to cooperate with (Imam & Zaheer, 2021). Therefore, trust in teams occurs collectively and it is one of the most important factors to build cooperation in partnering projects' success (Cheung et al., 2013). In fact, trust can be thought of as the glue that holds the global workplace since it was found to be the most important factor in building relational culture (Kumaraswamy et al., 2005). In cross-functional project teams, the project success relies on the members' knowledge and skills. Thus, the team depends on members' interpersonal relationships, such as the degree of trust (Buvik & Rolfsen, 2015). When a project starts, most of the project team members are most likely to meet each other for the first time, so it is

hard for them to develop trust instantly (Cheung et al., 2013). Furthermore, trust becomes especially critical in these teams because the team tasks rely on the expertise of the members to be achieved (Buvik & Rolfsen, 2015).

Delay

Delays can be an issue in almost all industries and most of the delays may become costly. In the construction sector, a lack of coordination in teams results in low productivity which is caused by reworks and frequent changes. Therefore, all these factors that cause time delays affect project performance (Yap et al., 2020). As in inadequate communication among team members, lack of communication among the key stakeholders can cause costly project delays (Tariq, 2013). Since most construction delays are costly, it is important to analyze the causes of delays to minimize the consequences of delays (Abd El-Razek et al., 2008). However, the teamwork factors that cause project delays are correlated with each other, and issues such as lack of expertise, improper judgment, lack of management, or lack of awareness of the key personnel can affect the whole project timeline (Tariq, 2013).

Focus

Focus is defined as "the concentration or centering of attention on a stimulus" (APA Dictionary of Psychology, 2021). Moreover, teams have a goal and all members of the team need to keep centering of attention on the common goal to contribute toward that goal. The determination to achieve team goals can be suggested as a crucial approach to efficient teamwork (Salas et al., 2015). However, keeping the team from distracting can be challenging. To focus on the team goal, it is important to have positive interactions among the team members. Positive team chemistry can provide mutual support, moreover, it helps boost team morale, promote creativity, and improve work satisfaction (Buvik & Rolfsen, 2015; Yap et al., 2020). In construction teams, setting clear goals to reduce changing ideas, reworks, and fewer distractions helps team members focus.

Conflict

Conflict is defined as "the occurrence of mutually antagonistic or opposing forces, including events, behaviors, desires, attitudes, and emotions" (APA Dictionary of Psychology, 2021). When two or more people perceive the other party's actions as a contradiction, conflict rises among the parties. Therefore, conflict is especially a challenge for teams since it can lower team performance and make team tasks more complicated (Salas et al., 2015). Even though conflicts can have harmful influences,

they can also have valuable ones in teams (Tabassi et al., 2019). Since project teams in the construction industry are mostly based on a competitive environment, compatibility issues are often neglected (Tarricone & Luca, 2002). Moreover, the main focus of the project team becomes the ambition of maximum profits, thus, causing a conflict of interest. Furthermore, the importance of teamwork is neglected since individuals seek their goals for profitability (Baiden & Price, 2011). Hence, to promote a trustful environment for team members to decrease the internal frictions and conflicts, communication and sharing of knowledge are essential (Hinds and Mortensen, 2005).

Motivation

Motivation can be defined as "a person's willingness to exert physical or mental effort in pursuit of a goal or outcome" (APA Dictionary of Psychology, 2021). It is a unique desire to put effort into individuals toward their goals. Work motivation, however, may include many factors such as salary, benefits, achievements, relationships with colleagues, and recognition of one's work is useful or important (APA Dictionary of Psychology, 2021). Therefore, teams too, need a common purpose and a goal to utilize individuals into understanding the interdependence of teamwork (Tarricone & Luca, 2002). When teams have poor collaboration, individual members are likely to lose their motivation (Hoegl & Parboteeah, 2007). Therefore, teamwork performance depends on the individual motivation of the members to achieve the common goals (Tarricone & Luca, 2002). However, challenges such as lack of top management support can decrease the team motivation, and therefore, the performance of the members (McComb et al., 2008). When projects have complexities and uncertainties, team members have to work highly interdependently to keep the project on its track and that requires motivation into collaborating (Hoegl & Parboteeah, 2007). Therefore, it is easier to utilize teamwork through motivation, especially through support, promotion, or sponsorship (McComb et al., 2008).

2.2 Resilience

The word “resilience” comes from the Latin word “resilire” which can be characterized as the capacity to recover rapidly from troublesome and possibly hurtful circumstances (Xue et al., 2018). The word resilience has been used in many senses from past to present. Depending on if it is a project, engineering design, a business association, a community, or others, the definition of resilience can fluctuate (Righi et al., 2015). The different uses of the term resilience, however, do not imply that these uses come from a common semantic origin. There are different methodologies under different uses. In engineering, the resilience term mostly refers to being flexible, defined as "able to quickly return to its usual shape after being bent, stretched, or pressed" (Cambridge Online Dictionary, 2020). Engineering systems from bridges to buildings and infrastructure are designed not only for heavy loads and stresses but also for quick recovery and returning to normal form when the load is off (Martin-Breen & Anderies, 2011). While this concept was used in engineering in the 1800s, it began to be used in behavioral sciences in the 1970s (Alexander, 2013; Garmezy & Masten, 1986). In behavioral sciences such as psychology, psychiatry, or sociology, resilience definition implies the ability to maintain mental health even though having a traumatic experience (Herrman et al, 2011). In this context, the word resilience is defined as "the ability to be happy, successful, etc. again after something difficult or bad has happened" (Cambridge Online Dictionary, 2020). In addition to individualistic resilience, the definition of resilience may vary for humans as social beings living in communities. In an ecological context, social resilience meaning is the ability of a group or community to cope with external stress or discomfort caused by environmental, social, or political changes (Windle, 2011). Therefore, resilience has no general definition (Knight, 2007).

Resilience is based on "bouncing back" from the stressful experiences people gain throughout their lives (APA, 2013). Moreover, the idea of resilience can be applied to any functional system (Turner et al., 2017). When the resilience concept is applied to society, it becomes defined as being able to protect itself from harmful events such as wars, natural disasters, or revolutions (Vale & Campanella, 2005). In an economic concept, resilience means the ability of a business organization to be able to endure risks and seize opportunities even in unfortunate events (Delli Carri, 2019).

Therefore, over time, the concept of "organizational resilience" has been studied as a characteristic of the organization to cope with internal or external shocks arising from disturbances and unexpected situations in the organization (Bui et al, 2019).

2.2.1 Organizational Resilience

The main definition of organizational resilience is described as the organization's ability to recover from hardships or challenging events, by responding to endangering situations (Varajao et al., 2021). Moreover, this ability not only includes the organization to endure challenging circumstances but also bounce back from them to continue staying on track for its needed future objectives safely (Fleming, 2012).

From the perspective of human resources, the main objectives for a resilient organization are to be flexible, agile, and dynamic, thus, to have a better chance to survive against external factors mostly arising from the competition (Bui et al, 2019). From another perspective, organizational resilience can be described not only as bouncing back from unexpected challenges but also as an opportunity to absorb adverse situations and enabling organizations to exploit more opportunities for the future (Lengnick-Hall et al., 2011). Bouncing back definitions assume a single desirable outcome for resilient organizations. However, if crisis situations are considered a cascading process, the organization must be able to evolve by constantly responding to challenges (Darkow, 2019).

Organizational resilience is generally thought of as being able to anticipate risks and avoid potential difficulties. However, for practicality, it may be simpler to develop immunity by confronting what has happened before than to avoid risks that are unlikely to happen - perhaps never happen (Andersson et al., 2019). Additionally, an organization may try to expect possible future risks, however, these anticipations may cause a weakness towards other unpredicted circumstances (Hillmann & Guenther, 2021).

Having resilient systems that are both strong and able to adapt quickly simultaneously brings a paradox to organizational resilience (Zolli & Healy, 2012). This means needing high-quality operations without requiring too many resources as well as balancing between planning long-term development and short-term effectiveness of operations (Andersson et al., 2019). Thus, structural efficiency

issues come from rigidity problems that resilient organizations have to deal with (Linnenluecke et al., 2012).

Organizations have been structured more team-based lately (Hollenbeck et al., 2012). Thus, resilience has become a team-level concept, not only by managing the challenges effectively but also by enabling teams to adapt to adversity and manage pressures, rather than being an individual-level capacity (Hartwig et al., 2020). For the success of the organization, it is of great importance to investigate its units - teams, and how they work, process, and learn (Rodríguez-Sánchez & Perea, 2015). Therefore, this thesis research focuses on team resilience to achieve organizational resilience.

2.2.2 Team Resilience

Team resilience can be defined as the capacity of a team to cope with difficulties, absorb them, and maintain positivity against challenges (Carmeli et al., 2013). From one perspective, when team resilience is defined as being able to cope with difficulties, it is considered an observable ability only in the face of difficulties and can be studied in the post-difficulty phase (Hartwig et al., 2020). However, from another perspective, team resilience can actually be defined as a dynamic process in which adversities are effectively overcome continuously (Morgan et al., 2013).

As projects become more complex day by day and their degree of adversity increases, it becomes necessary to cope with these mostly environmental challenges on an individual, team, and even organizational level (Morcov et al., 2020). Due to these increasing complexities, projects require more teamwork and the roles of teams in organizations are becoming more important (Amaral et al., 2015). Teams are included in organizations with their strengths and weaknesses. Therefore, the decisions of the organization can directly affect the resilience of the team (Rodríguez-Sánchez & Perea, 2015). With the help of resilient thinking, managers can improve performance and reliability through flexible and systematic approaches to challenges. Moreover, they can provide stability by solving problems by creating new conditions (Varajao et al., 2020).

According to researchers, the presence of only resilient individuals in the team is not enough to create a resilient team (Hartwig et al., 2020). Having a resilience capacity does not necessarily mean having a resilience capability (Lengnick-Hall et al., 2011). In other words, a group of individuals with high resilience may not be able to cope

with adverse conditions or communicate effectively in an organized manner as they should (McEwen & Boyd, 2018). Therefore, in order to develop team resilience, it is necessary to provide individuals with a team structure that has common rules and values, transformative leadership, and is in constant interaction with each other, even in unexpected times of difficulty (Morgan et al., 2015; van der Beek & Schraagen, 2015). Resilience in challenging situations can be achieved with a team with common goals, interdependence, and result-oriented work (Hartwig et al., 2020).

Just like the behavior of individuals, teams have similar behavior and working systems (Stewart, 2010). Teams, like individuals, have knowledge of what they think, skills about what they do, and attitudes about how they feel. Moreover, they can be adversely affected in times of stress even though the negativities are on an individual basis, their effects will be reflected in the team's functioning (Dietz et al., 2017). It is important for teams to develop their resilience, as well as individuals, against adverse situations. For example, employees in a more resourceful work environment (such as supportive co-workers) increase their own resilience. This suggests that the quality of relationships is important for team resilience (Meneghel et al., 2016). In addition, while resilience reduces psychological stress, it has the effect of increasing task performance and job engagement (Hartwig et al., 2020). Strategies are factors that help develop resilience, moreover, it is necessary to understand the skills and support for building resilience required (Holdsworth et al., 2019). Therefore, this study focuses on developing team resilience strategies for more resilient organizations.

2.2.2.1 Strategies for Developing Team Resilience

Strategies for developing team resilience are examined as follows: maintaining positivity, adaptability, decision-making, cooperation, problem-solving, well-being, managing time, networking, and managing risks.

Maintaining Positivity

Maintaining positivity, as an aspect of resilience, refers to the ability to reorganize negativities, focus on solutions, and manage disruptions (Turner & Simmons, 2020). There is an obvious link between maintaining positivity and adapting better to stressful events (Knight, 2007). A significant amount of research has also highlighted the importance of a positive attitude in the development of resilience at the team level, even though generally on an individual basis (Meneghel et al., 2016).

Emotions and emotional reactions within a team, like individuals, can come together to create a mood. Subsequently, teams can improve their resistance to challenges by increasing team resources with these moods, just like individuals (Fredrickson & Losada, 2005).

The ability to focus emotionally on optimism is very important for the development of individuals and for maintaining personal well-being. Positive and optimistic emotions can encourage employees to see hope, reduce negative effects, and provide perspective to increase the adaptability of employees (Liang & Cao, 2021). The B&B theory of positive emotions by Fredrickson explains associating positive emotion experiences with the development of resources for long-term success and well-being (Meneghel et al., 2016). This theory assumes that positive emotions develop personal resources such as resilience by expanding people's immediate thought-action options (Fredrickson et al. 2003; Tugade & Fredrickson 2004). Furthermore, positive thinking has a mutual impact on resilience as positive emotions build resilience, resilience may provide better emotional well-being (Fredrickson & Joiner, 2002).

The strategy of maintaining a positive attitude in difficult times significantly reduces stress (Smith et al., 2011). Strategies such as avoiding disappointments, preventing depression, and giving perspective to what needs to be done are important in terms of turning negative choices into positive ones when coping with stressful situations (Turner & Simmons, 2020). According to Amaral and others (2015), to increase team resilience, promoting a positive and loyal team environment has been one of the most prominent factors. In this way, the organization can remind its employees of positive emotions that will keep them positive even in negative situations (Luthans et al., 2006). While employees on the team are individually competent, they may still want to emulate their leaders, whether for reminders or approval. In this case, the leader's positive attitude can be a very strong motivator (Moss et al. 2009). Managers who believe that they can cope with stressful environments, share motivation and a common vision, and increase the resilience of their employees with their experiences will be successful in developing resilience compared to those who are afraid of difficulties and doubt their actions (Liang & Cao, 2021). Therefore, maintaining positivity on the individual, team, and leader levels improves organizational resilience.

Adaptability

The word adaptation comes from the Latin words to fit or combine (Savickas & Porfeli, 2012). Adaptability is used today to mean the capacity to react appropriately to changing situations (APA Dictionary of Psychology, 2021). According to most researchers, positive adaptation to challenging situations provides resilience (Hartwig et al., 2020). Therefore, being able to adapt to changing situations plays an active role in coping with unexpected effects in the process (Giezen et al., 2015). In this way, the ability to adapt can contribute to both individuals and organizations in terms of resilience.

Changes, inevitably, require organizations to adapt. For example, technology as part of modern work has been one of the most common changes encountered in the work environment (Burke et al., 2006). Recently, adapting to the use of computers may have become inevitable. In order for organizations to achieve such an adaptation, their employees need continuous learning (Hollenbeck & McCall, 1999). Another change has been with the shift to knowledge-based work instead of manufacturing. Therefore, the need for employees' skills and expertise has increased, and the tendency to create collaborative project teams has increased (Burke et al., 2006). With this development, apart from the team environment where the fields of expertise change, it is also necessary for individuals to work in harmony as a team (Hesketh & Neal, 1999).

For adaptable organizations, there are 3 factors: team, leader, and individual levels. Increasing organizational competitions driven by economic resources require individual adaptation to dynamic adaptation at the organizational level. Individuals who are able to adapt to sudden change, develop new approaches, and work in complex and uncertain environments have gained importance (Turner et al., 2019). However, adaptability is always based on teams because when teams are formed with individuals brought together in line with specific tasks and when they work with high performance, they become much more valuable and durable than the sum of the individuals (Delli Carri, 2019).

Decision-making

Decision-making, as a resilience strategy, is to choose appropriate action under the constraints of limited time, information, and resources (Gushgari et al., 1997). Decision-making is the cognitive process of choosing between two or more varying alternatives (APA Dictionary of Psychology, 2021). Decision-making is claimed to

occur in multiple steps: (1) identifying the need for action; (2) determining which action will be chosen; (3) determining the consequences of the chosen action; (4) commitment to the action; and (5) continuing the action to the end (McAvoy & Butler, 2009). Resilience is concerned with coping with unexpected effects without risking delays due to uncertainties in the decision-making process (Giezen et al., 2015).

The current business environment is complex, thus, decisions need to be made quickly, resources must be allocated efficiently, and a clear focus (Caniëls & Bakens, 2012). However, the causes of decision-making problems in the organization and in teams are often kept secluded, even sometimes from the ones that are involved (McAvoy & Butler, 2009). While top management teams who make strategic decisions, and those decisions influence the performance of the organization, are held responsible for the decisions they make for their organizations, research shows that these teams can also affect their organizations negatively by making weak choices (Carmeli et al., 2013).

The overwhelming amount of information to make a decision may cause individuals to lose attention to related information or lose focus on mistakes (Caniëls & Bakens, 2012). Decision-making strategy requires the analysis of information, the creation of alternatives and strategies to solve problems, and the choice of the best alternative (Sagone & De Caroli, 2014).

Cooperation

In teamwork, it is required for several individuals to work together in interaction and harmony. Although at the core of teamwork, there is team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation, past researchers have suggested that it is required to have coordinating mechanisms assure team success (Salas et al., 2005). Therefore, the coordinating mechanism enables individuals to cooperate. Team cooperation includes the interaction and communication of team members to complete the team tasks (Tian et al., 2015).

As teamwork increases in organizations, interdependence has become a fundamental feature of organizational life. As individuals become dependent on each other like groups in organizations, these interdependencies can include emotion, belief, and trust (Jones & George, 1998). With interdependence, team members are able to provide sharing information, advice, resources, and assistance (Kuthyola et al., 2017). In many business structures, the performance of the individual, not the team,

comes to the fore. In such structures, an environment of competition occurs within the team and this reduces social interdependence. In fact, one of the most basic elements of teamwork is working together by focusing on a common goal and purpose (Tarricone & Luca, 2002). Individuals who provide mutual support can develop better social relations by feeling included in the team (Kuthyola et al., 2017). To achieve team cooperation, team members may need to have strong relationships, mutual respect, and trust. Development of strong relationships can be provided with trust, communication freely, and being constructive towards each other (Lueth, 2008). Trust can be viewed as confidence between individuals in a trade of some kind - that no one is at risk by their actions or mutual insurance or that no one takes advantage of other's weaknesses (Jones & George, 1988). Trust can enable people, teams, and organizations to work together cooperatively (Jones & George, 1988). With strong team cooperation, it is possible to improve trust between team members and build stronger emotional bonds (Tian et al., 2015). Subsequently, with strong and stable emotional bonds, resilience against difficulties increases (Knight, 2007).

Problem-solving

Problem-solving is the process by which individuals attempt to overcome difficulties, achieve plans that move them from a starting situation to a desired goal, or reach conclusions through the use of higher mental functions, such as reasoning and creative thinking (APA Dictionary of Psychology, 2021). The problem-solving strategy includes analyzing a challenging situation, causes for adversities, providing a solution, and applying the solution, respectively (Gushgari et al., 1997). Problem-solving is an essential feature in project management during the project life cycle (Ahern et al., 2014). In the ever-changing information age, an employee must be capable of participating in problem-solving (Goltz et al., 2007).

Resilience requires the capacity to solve problems because, without it, unresolved complexities cannot provide sustainability (Tainter & Taylor, 2014). Individual resilience can enable oneself to overcome emotional stress and motivate others to make decisions faster as well as take action towards solving problems in an adverse event (Liang & Cao, 2021). With problem-solving skills, individuals are even able to anticipate further from the current situations and that way, are able to compare alternatives, thus, are adaptable to changes (Knight, 2007). Teams with high problem-solving skills can carry out projects more effectively because they are more resilient in the face of uncertainties (Carmeli et al., 2021).

In team environments where many individuals contribute, it may be easier to solve problems in conditions such as brainstorming in the face of difficulties, where ideas are mutually presented until optimum solutions are sought. The learning process of exchanging knowledge helps team members understand why and how the mistake or problem occurs and thus how it can be solved. Moreover, in teams, social support seeking from each other plays a bigger role than members' resilience or competence to solve problems instead of running away from them (Li et al., 2018).

Well-being

Well-being can be defined as a "state of happiness and contentment, with low levels of distress, overall good physical and mental health and outlook, or good quality of life" (APA Dictionary of Psychology, 2021). Well-being can be described as a captured psychological state at a point in time of an individual. Therefore, the well-being and resilience of people are dependent on each other since, over time, the quality of life of the individual is shaped according to their mental stamina. Team well-being targeting a group of individuals can be considered as group morale or the desire to contribute effectively to the group's performance (Warr & Nielsen, 2018). As many individuals do, businesses, too, aim to be in a healthy mood. Moreover, if their employees do not have healthy well-being, this will affect the success of the business (MacDonald, 2005). Thus, the organizational benefits of employee well-being towards resilience and productivity have been discussed by researchers (Tonkin et al., 2018).

In many countries and companies, employees are obligated to be provided with psychological and physical safety where they work under occupational health and safety laws. However, many employees experience stress and feel obligated to work even when they are sick (Tonkin et al., 2018). Stress affects individuals on attention, memory, problem-solving, judgment, decision making, and individual team performance mechanisms (Dietz et al., 2017). Furthermore, even though stress has social costs, it also has significant business costs for economies in terms of low productivity. For instance, the World Health Organization estimated stress costs to be around 300 billion dollars a year for American enterprises, and around 20 billion for European enterprises (Bogomolov et al, 2014).

Individuals spend a significant part of their lives at work, so employers need to support the well-being of their employees at the workplace by providing a stress-free and physically safe environment (Garg, 2017; Currie, 2001). Another perspective of

well-being can include the feeling of being part of teams or organizations (De Simone, 2014). Therefore, open communication, team working and cooperation, flexibility, support, and a balance between work and personal life are fundamental factors in achieving personal and organizational well-being (Baptiste, 2008).

Managing Time

Managing time can be defined as the ability to use the time to complete things when they should be done. In an ever-increasing world of workforce demands, being able to manage time as one of the primary resources is of great importance. Team members can increase team performance by managing their time effectively and increasing their working efficiency, therefore improving team resilience. Time management strategy is about setting goals and prioritizing those goals (Eerde, 2003). Effective time management has not only economic but also physical and psychological effects. In the case of effective management of time, more efficient results are obtained, while in the case of poor management, low performance and psychological effects such as anxiety and stress are observed in individuals (Sainz et al., 2019).

Some people have a tendency to procrastinate, even under pressure, with an instinct to avoid difficulties (Eerde, 2003). Moreover, individuals' perceptions of time may differ, as some individuals may not prioritize completing tasks on time, which may affect the team's collective perception of time and complicate processes (Saunders et al., 2004). People with better time management skills have a better sense of the time that is required to complete tasks whereas less skilled ones do not (Rapp et al., 2013).

Team resilience is shaped by common rules and goals and focuses on creating a team structure by creating productive member interactions in unexpected situations and thus developing the team (Varajao et al., 2020). As communication is seen as an important tool for the function and coordination of group structure, teams often consist of interacting individuals. However, from a different perspective, too much communication can lead to unproductive behavior and conflicts, which can reduce team performance (Bui et al, 2019). Teamwork can often involve intense meetings, and it should not be forgotten that these meetings consume time. In order to use time effectively, the team should not plan time-consuming meetings unless absolutely necessary. Often, the emails that employees send to each other to share information consume a lot of time. Sending emails only to individuals who need to see them will

save time by eliminating the need to read and respond to unsolicited emails (Thomack, 2012).

Networking

The term "network" refers to any system of interconnected units or elements and can be applied broadly in psychology, referring, for example, to participants in social relationships or interactions (APA Dictionary of Psychology, 2021). In social systems such as teamwork, it is crucial to have a functioning sort of network. Team members have mutual work goals in that team with interdependence towards each other, thus communication has been considered one of the most important interaction tools for functioning teamwork towards achieving goals (Hartwig et al., 2020; Bui et al, 2019). Moreover, it is essential to have some level of social interaction with co-workers and supervisors in almost any job to not feel left out or isolated (Kirkman et al, 2002).

It is crucial for businesses that have team-related works and projects to keep the continuity of professional networking as the importance of employees' social networks is increasing in the workplace (Bennett et al., 2010). That is why interaction networks among co-workers can be considered important drivers of organizational resilience (Massari et al., 2021). To achieve resilience and personal well-being in adverse situations, it is crucial to focus emotionally (Liang & Cao, 2021). Employees can be encouraged to think positively to reduce stress and negative effects in such situations through positive and supportive emotions. As a key role of human resources management to promote employee resilience, the organization can help its teams improve their social networks by creating an environment that encourages them to connect with other employees and peers. As employees build networks, it can create a social capital that can achieve a competitive advantage (Miller et al., 2007). With improving social capital and resilience capacity, teams can provide more trusted information, more collective action, and countermeasures in times of adversities (Belblidia, 2010). Networking not only provides more efficient information sharing through more frequent communications, but it can also affect the socio-emotional functioning of the team indirectly. Subsequently, with more open communication, conflicts between team members can be solved and a more trustful team environment can be achieved (Bui et al, 2019).

Managing Risks

Risk can be defined as "the probability or likelihood that a negative event will occur, such as the risk that a disease or disorder will develop" (APA Dictionary of Psychology, 2021). As projects become more and more complex, the risk of adversity rises. "Risks can be transferred, accepted, managed, minimized, or shared, but cannot be ignored" (Rahman & Kumaraswamy, 2002). Therefore, as an adjustment mechanism, managing risks become crucial for organizations to overcome difficulties (Varajao et al., 2020).

Managing risks includes developing awareness against uncertainties, identifying the risks, steering the controllable ones, and reducing the effects of uncontrollable ones by risk distribution (Liu et al., 2007). The ability to anticipate possibilities and risks can help organizations to reduce their weakness by raising awareness (Hillmann & Guenther, 2021). Organizations that want to increase their resilience by reducing their weaknesses require risk assessment skills. With the improvement of the risk assessment skills, more information can be gathered, therefore, the organization can be more aware of its environment (Darkow, 2019).

Both uncertainty and risk are the dynamic functions of the quantity and quality of knowledge (Krynke et al., 2021). As a part of teamwork, the total level of knowledge and understanding can be increased by exchanging ideas with other members. Moreover, this can provide an advantage for team resilience during the pre-assessment of risks by foresight in multiple futures. At times of uncertainty, as do at individual levels, by generating new ideas, interpersonal and problem-solving skills can be applied at the team level for developing team resilience (Vera et al., 2017).

2.3 Construction Industry in Pandemic Era

In December 2019, in Wuhan (China), the epidemic started and has been a major global threat to human health. As of 11 March 2020, The World Health Organization (WHO) announced this outbreak as a pandemic (Sierra, 2021). Since the disease can be transmitted by respiratory droplets in direct contact with the mouth, nose, or eyes and by direct contact with infected people or indirect contact with infected surfaces, containment measures introduced have included recommending people stay at home and quarantining outbreaks regions (WHO, 2020; Pirzadeh & Lingard, 2021). Therefore, most governments around the world have enforced strict lockdowns,

including restricting people's movements and gatherings, to decrease the spreading of the virus (Sierra, 2021). Both human health and the operational health of businesses were affected because of the pandemic. Work health and safety issues have also become a challenge for organizations and industries to carry on business operations during the pandemic (Caligiuri et al., 2020). Governments and employers have encouraged workers to work at home (also can be referred to as teleworking). Moreover, 88% of worldwide organizations implemented home-based work according to the survey that 800 globally leading human resources attended (Pirzadeh & Lingard, 2021). However, dramatically decreased demands and production have impacted most sectors of the economy. Covid-19 has had major effects on the global economy through forced lockdowns and economic shutdowns - beyond easy recovery (Ogunnusi et al., 2021). For instance, the US economic activities by GDP have shrunk by 5% in the first quarter, and 32% in the second quarter of 2020 resulting in one of the most severe economic shocks in modern times (Meyer et al., 2022). The construction industry was not immune to the impacts of the pandemic either and had to absorb these financial shocks just like every other business.

The construction industry is one of the biggest industries in the world and it makes for about 13% of the global gross domestic product (GDP) (AlChaer & Issa, 2020; Biorck et al., 2020). Moreover, the construction sector has relationships with many sectors both directly and indirectly. Therefore, the construction industry is considered an important operator of economies (Assaad & El-adaway, 2021). Even without Covid-19, the construction sector has always been battling time and cost overruns as one of the major setbacks (Ogunnusi et al., 2020). With the restrictions, as in most industries, many construction projects also stopped. Being behind schedule and the exceeding costs of idling equipment made it an expensive issue for the sector (Alkhalouf, 2020). Due to supply chain issues, delays in planning, operational restrictions, and inspections the construction industry was affected heavily by the coronavirus (Biorck et al., 2020). While the sector was being affected by restrictions, many companies were facing collapse and going out of business and some of them resumed working with disrupted workflow. For instance, construction organizations had to either shut down both domestic and/or international sites or continue their projects at a lower capacity resulting in labor, material, and equipment supply issues (Chih et al., 2022). According to the survey conducted by Build UK on

behalf of the Construction Leadership Council, from September 2020, the construction company would most likely face a 7.7% reduction in the workforce while the industry anticipates a 26.7% decrease in agency workers and self-employed (Ogunnusi et al., 2020). Since all these issues such as unemployment and downsizing in organizations are interconnected and have led to a lack of cash, manpower, and resources in general, it created a chain of delays, loss of labor productivity, and contractual issues (Assaad & El-adaway, 2021). Due to the pandemic, the construction industry was not able to adopt telecommuting as easily as other sectors to lessen the safety issues without disrupting productivity (Al-Mhdawi et al., 2022). Furthermore, the construction sector in developing countries was more vulnerable to the challenges caused by the pandemic. Due to financial issues such as rising exchange rates, inflation, fluctuations in material costs, and escalated interest rates the negative effects of the pandemic were more significant in developing countries (Al-Mhdawi et al., 2022).

With the pandemic, it is important for the construction industry to address the challenges in many ways. According to Assaad and El-adaway (2021), the pandemic has many future research areas and one of them could be the implications of teamwork during the pandemic. Moreover, the significance of the organizational context for psychological factors concerning their connection to teamwork can be identified as a subject for future research (Rasmussen & Jeppesen, 2006). Therefore, this thesis research focuses on teamwork challenges in the construction industry in the pandemic era.

2.3.1 Teamwork Challenges in Pandemic Era

Compared to other industries, teamwork productivity and quality in the construction industry have already been lower (Aapaoja et al., 2013). Moreover, due to the pandemic challenges that created more challenging circumstances with restrictions, the productivity of teamwork in the sector was affected negatively. With the use of technology, remote teams have been used in organizations for years, but Covid-19 has required organizations to adopt them globally for self-isolation purposes. The development of remote collaboration has made teamwork more complex (Mitchell & Brewer, 2021). While teleworking made it possible for business operations to carry on, it also caused individuals to experience many challenges that come with it (Lingard et al., 2021). In this context, the challenges are examined as follows:

workplace loneliness, disturbed life-work balance, reduced engagement, lack of communication, lack of trust, lack of motivation, and overwork.

Workplace Loneliness

With the implementation of restrictions, many employees, including project-based construction professionals and managers started working from home for self-isolation purposes - creating virtual teams. Therefore, employees are removed from their colleagues hence, their social life at work. During the Covid-19 pandemic, workers may have been impacted negatively by the lack of social interaction and connections through work. Some level of social interaction with co-workers is necessary for almost all jobs. Although utilizing virtual teams through teleworking has been operating for decades, one of the main disadvantages of virtual teams is the lack of physical interactions since the lack of these interactions may create the feeling of isolation and being left out (Kirkman et al., 2002). Moreover, teleworkers feel more lonely, worried, and guilty compared to their office-working colleagues (Mann & Holdsworth, 2003).

Disturbed Life-Work Balance

The adaption of digital technologies has made it possible to use time more efficiently and productively, yet reduced social engagement has also impacted individuals' work and life balance (Lingard et al., 2021). It is reported that social isolation causes psychological issues and reduces the satisfaction of the job among people who work from home (Bentley et al., 2016). Similarly, it is also reported that increased stress which related to social isolation such as not being able to separate work from family, or ending up working longer hours (Montreuil & Lippel, 2003). For example, according to a survey of 436 teleworkers in Lithuania during the COVID-19 pandemic, the difficulties of new ways of working remotely impacted some employees negatively in terms of self-organization and separating work from personal life (Raišienė et al. 2020). In addition to the challenges of working from home, some construction professionals also may choose to work even though they should be resting (Ogunnusi et al., 2021).

Reduced Engagement

Conventionally, it can be thought that teams that work face-to-face are more productive and satisfied compared to virtual teams that have feelings of isolation and disengagement towards their job (Ogunnusi et al., 2021). Adopting remote working to utilize remote meetings or enabling remote site inspections are beneficial for many

construction organizations (Lingard et al., 2021). However, along with the benefits of home-based teleworking for individuals and organizations, the negative aspects are sometimes overlooked. For instance, it is reported that home-based teleworkers in the US experience less social support and increased uncertainty about their roles at work (Pirzadeh & Lingard, 2021). As a part of the negative impacts of Covid-19 on the construction industry, some people working home-based reported that they did not have enough space at home and due to distractions at home, had challenges focusing on their work (Ogunnusi et al., 2021).

Lack of Communication

Sharing knowledge, coordination and communications are the keys to expecting the effectiveness of the team, therefore, in virtual teams, the coordination decreases as it is harder to communicate (Garro-Abarca et al., 2021). Decreasing social interactions may result in reduced commitment and performance. Lack of direct communication with managers and team members due to virtuality, in general, may cause confusion, miscommunication, and uncertainty among team members (Raišienė et al., 2020).

Lack of Trust

Trust provides stronger leadership, communication, and cohesion to the teams. Therefore, it can be considered that trust has one of the most important roles especially in increasing virtuality because of the Covid-19 pandemic (Garro-Abarca et al., 2021). In the creation of successful virtual teams and organizations, building trust can be the greatest challenge, therefore, barriers such as traditional attitudes are needed to be transformed into thinking cooperatively (Kumaraswamy et al., 2005). The level of trust among teams working remotely is generally lower compared to ones who work face-to-face (Raišienė et al., 2020). With reduced communication with social isolation, some challenges may arise such as concerns and jealousy among employees which may lead to mistrust (Bentley et al., 2016). Moreover, lack of trust becomes an issue in the execution of work effectively for teams. Many organizations require constant social interactions to build trust which virtuality eliminates (Raišienė et al., 2020). However, trust within teams can be built when people deliver what they promised and meet the results.

Overwork

Some studies show that working remotely is more beneficial for employers than for employees because it requires teleworkers to put more hours and effort beyond normal office working hours (Pirzadeh & Lingard, 2021). According to the study of

Covid-19 effects on the UK construction, reduced workforce on-site affected schedules, and required employees to manage sites without a margin of error, thus, increasing working stress among employees. Moreover, conditions like these increased the risk of fatigue from overworking and negatively affected well-being (Jones et al. 2020). Even though online interactions may reduce teleworkers' feelings of isolation, overworking remotely and constant communication due to limited other social activities because of Covid-19 may also cause individuals to spend too much time at work (Pirzadeh & Lingard, 2021). In addition, teleworkers may experience being 'out of sight, out of mind' and concerned about opportunities they may miss, which can lead to overworking more to impress managers among other employees (Bentley et al., 2016; Ono, 2022).



3. METHODOLOGY

To reach the study's objectives, a specific methodology was developed, including a comprehensive literature review and a survey. Figure 3.1 represents the methodology and stage of this study:

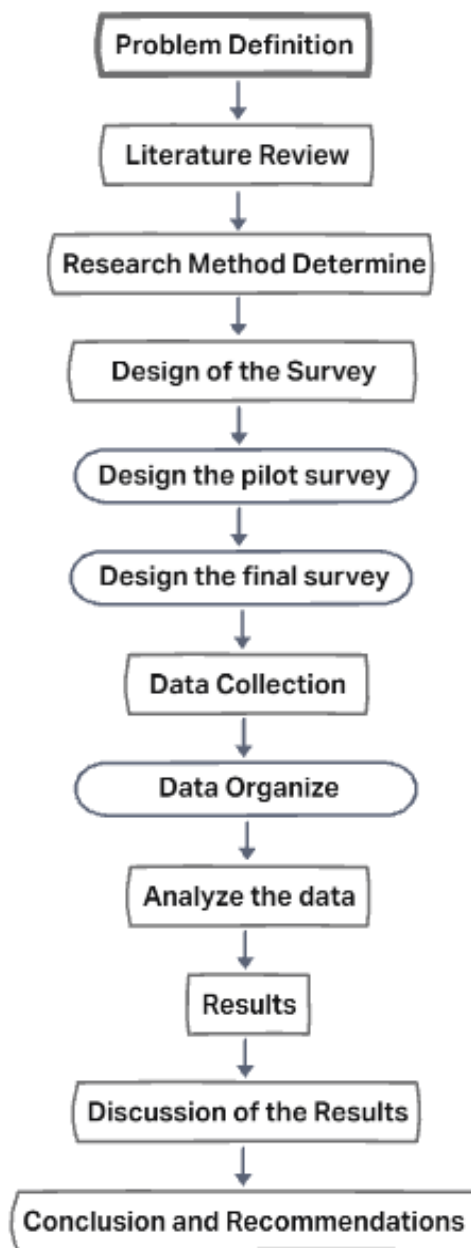


Figure 3.1 : Flow chart of the research method

The literature review in Chapter 2 concludes that there was a gap in the teamwork resilience and challenges in the construction industry, and how Covid-19 pandemic affected these issues in the industry. The result of these steps determined the subject of the thesis as “TEAM RESILIENCE IN THE CONSTRUCTION INDUSTRY: EXPERIENCES FROM THE COVID-19 PANDEMIC”. After the determination of the subject, a thorough literature review started about resilience, organizational resilience, team resilience, and followed by strategies for developing team resilience. Teamwork in the construction industry and the challenges that come within were investigated. Experiences from the pandemic to focus on challenges in the industry were researched.

3.1 Design of the Survey

Based on the information obtained from the literature review, themes related to the adverse situation experienced by construction professionals at work, and resilience strategies were revealed. Therefore, the questionnaire was designed associated with these themes. The questionnaire consists of four parts:

- (1) Personal information
- (2) Adverse situations experienced by construction professionals at work
- (3) Teamwork challenges experienced by construction professionals during the Covid-19 pandemic
- (4) Resilience strategies in teamwork

The first part comprises profiles of the survey participants, including education level, the field of work, the total work experience in the construction industry, the position of the job, and how they work during the pandemic (remotely, at the office, or on the field, or hybrid).

The second part consists of fourteen items to evaluate the adverse situations experienced individually by the construction professionals at work. These items consist of challenging factors defined in the literature and the response to each item is measured on a five-point Likert scale, where 1 = strongly not suitable, 2 = not suitable, 3 = neutral, 4 = suitable, and 5 = strongly suitable. For example, participants

who experience adversities at work due to the factor "increasing communication difficulties" score this factor as "5".

The third part consists of twelve items to evaluate the teamwork challenges experienced by construction professionals during the Covid-19 pandemic. These items consist of challenging factors defined in the literature and the response to each item is measured on a five-point Likert scale, where 1 = strongly not suitable, 2 = not suitable, 3 = neutral, 4 = suitable, and 5 = strongly suitable. For instance, participants who experience teamwork challenges at work due to the factor "lack of trust in team" score this factor as "5".

In the final part of the questionnaire, there are a total of seventeen items consisting of team resilience strategies. These items consist of expressions representing resilience skills and strategies described in the literature. The response to each item is also measured on a five-point Likert scale, where 1 = strongly not suitable, 2 = not suitable, 3 = neutral, 4 = suitable, and 5 = strongly suitable. For example, the "maintaining a positivity" strategy is expressed as "I was able to maintain my positive attitude", and participants who have never applied this tactic score this item as "1".

A pilot survey was conducted with 2 project managers with expertise in the construction industry to determine the errors and incomprehensibility of the questionnaire. The survey was revised following the feedback from the pilot questionnaire, thus the final version was ready to be distributed for collecting data.

3.2 Data Collection

Due to the Covid-19 pandemic and in order to reach more people within the determined period of the study, the online survey method was used as a data collection method. This questionnaire was conducted using Google Forms for all participants. The data within the scope of the research were collected between February 2022 and April 2022. The people to whom the questionnaire was sent were reached through sectoral and personal relations. The survey was sent to 125 professional and it was determined that total of 82 participants answered each question and all answers of the participants were valid. The participants consist of

civil engineers, architects, and project managers working in Turkey or abroad and working actively in the relevant sector.

3.3 Data Organization

Once the questionnaire process was completed, the results of the questionnaire were organized by using Microsoft Excel and the data was analyzed by using the Statistical Package for Social Sciences (SPSS) for Windows™ Version 26 at a 95% confidence level.

Reliability Analysis

Before the statistical analysis of data, a reliability test was conducted. One of the most popular reliability statistics used today is Cronbach's alpha. Cronbach's alpha determines the internal consistency among the collected responses under the adopted Likert scales or mean correlation of the items in the questionnaire to measure their reliability. Cronbach's alpha is a reliability index associated with variation calculated from the true score of the basic construct (Cronbach, 1951). The Cronbach Alpha value is the average value of the reliability coefficients for all questions (Gliem & Gliemi 2003). Cronbach's alpha value of 0.70 and above represents a reliable and valid questionnaire (Cronbach & Shavelson, 2004). In this study, the values of Cronbach's alpha coefficient for teamwork challenges and resilience scales were 0.883. Since this value was more than 0.7, the reliability of the questionnaire was established for further analysis.

Descriptive Analysis

In this section, the descriptive statistics of mean scores given professionals by each teamwork challenges, resilience strategies and teamwork challenges experienced in the pandemic are analyzed.

Inferential Analysis

According to the Kolmogorov-Smirnov test, the normality test performed in the SPSS program, and it was determined that the data did not show a normal distribution. This revealed that the analysis method to be chosen in the study should be non-parametric testing. Mann Whitney U-test and Kruskal Wallis H-test were used to analyze whether the scale score differed according to demographic characteristics. While the Mann-Whitney U-test was used to analyze demographic variables with two groups, the Kruskal Wallis H-test was used to analyze variables with groups of k ($k > 2$).

Mann-Whitney U-test

Since the data did not show normal distribution according to the normality test, the non-parametric Mann-Whitney U-test was used instead of the t-test in this study. The Mann-Whitney-U test tests the significant differences between two independent groups on a single ordinal variable that does not show a certain distribution (Mann & Whitney, 1947). While testing the data, the significance levels were accepted as 0.05 and 0.1. When evaluating the outputs obtained from the analysis, it was concluded that there was no significant difference between the variables in which the difference was greater than 0.1 and that there was a very significant difference between the variables in which the difference was less than 0.05.

Kruskal-Wallis H-test

In this study, where the data did not show natural distribution, the Kruskal-Wallis H-test was used to test the responses of participants with more than two independent variables to the dependent variables. To define the result of these statistical tests of the p-value which expresses the probability of an effect occurring for each dependent variable, this study employs the common threshold of a p-value less than 0.05 at a 95% confidence level. Moreover, post-hoc Dunn's statistical test was applied to the set of pairwise comparisons to compare each independent variables with each other.

Correlation Analysis

In this section, correlation analysis was conducted at the 95% level to see the significant P-values between the resilience strategies of the construction industry professionals and the teamwork challenges they experienced during the pandemic.

4. FINDINGS AND ANALYSIS

The results of the questionnaire were analyzed by using the Statistical Package for Social Sciences (SPSS) for Windows™ Version 26 and were run at a 95% confidence level. The questionnaire is presented in Appendix.

Profile of the survey participants

82 people participated in the survey and the demographic characteristics of the industry professionals participating in the survey were examined in the first part. The participants were asked about their gender, profession, education level, industry, total work experience, working status in the country or abroad, and how they worked during the pandemic. Among 82 participants, while 38,8% of them were female, 62,2% of them were male. 51,2% of the participants have a bachelor's degree, 45,1% have a master's degree, and 3,7% have a PhD.

The field of work of the professionals was assessed, accordingly, 84,1% of the participants were working in the private sector in the construction industry, 7,3% of them were in the public sector, and 8,5% of them were in the academy. While 80,5% of the participants were working in Turkey, the remaining 19,5% of them were working abroad. More than half of the participants indicated that they were civil engineers (62,2%), while 37,8% of them were architects. 6,1% of the participants were project managers, 9,8% of them were construction supervisors, 12,2% of them were team managers, and the remaining 72% of them were team members. 34,1% of the participants have 0-2 years of experience, 42,7% of them have 3-5 years of experience, 13,4% of them have 6-10 years of experience, 7,3% of them have 11-15 years of experience, and 2,4% of them have experience of 16 years or more.

The participants working conditions during the Covid-19 pandemic were assessed, accordingly, 23,2% of them were working remotely, 20,7% of them were working at the office, 17,1% of them were working in the field, and 39% of them were working as a hybrid. Also, 36,6% of the participants stated that they experienced health issues during the pandemic. Table 4.1 summarizes the profile of the survey participants.

Table 4.1 : Profile of the Survey Participants

Demographic variables	Descriptions	N	%
Gender	Female	31	37,8
	Male	51	62,2
Education level	Undergraduate - Graduate	42	51,2
	Master - Graduate	37	45,1
	PhD - Graduate	3	3,7
Field of work	Private Sector	69	84,1
	Public Sector	6	7,3
	Academy	7	8,5
Work Location	Turkey	66	80,5
	Abroad	16	19,5
Profession	Civil Engineer	51	62,2
	Architect	31	37,8
Profession Role	Project Manager	5	6,1
	Construction Supervisor	8	9,8
	Team Manager	10	12,2
	Team Member	59	72,0
Job Experience	0-2	28	34,1
	3-5	35	42,7
	6-10	11	13,4
	11-15	8	9,8
Working Condition	Remote Working	19	23,2
	Office	17	20,7
	Field	14	17,1
	Hybrit	32	39,0
Experiencing Health Issues	Yes	30	36,6
	No	52	63,4

Descriptive Analysis

In this section, the descriptive statistics of team challenges in the pre-pandemic period, teamwork challenges experienced in the pandemic, and resilience strategies are analyzed respectively. At first, the mean scores given for the teamwork challenge factors in the range of 1-5 points experienced by the construction professionals were given (Figure 4.1).

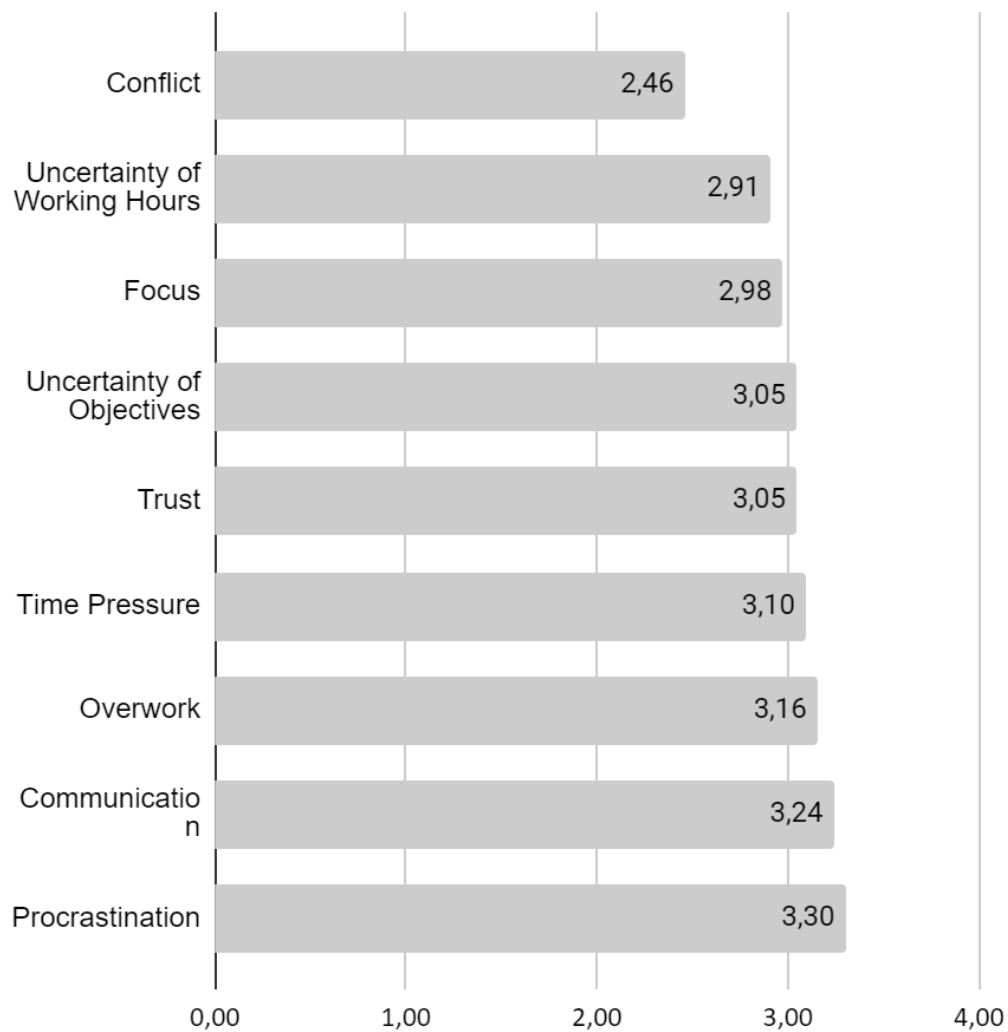


Figure 4.1 : Mean score of each teamwork challenge factor

As a result of comparing the mean score of each challenge factor: Conflict and Uncertainty of Working Hours cause the least adversities while Procrastination and Communication cause the most adversities among team members.

Figure 4.2 presents the mean score of each resilience strategy in the pandemic.

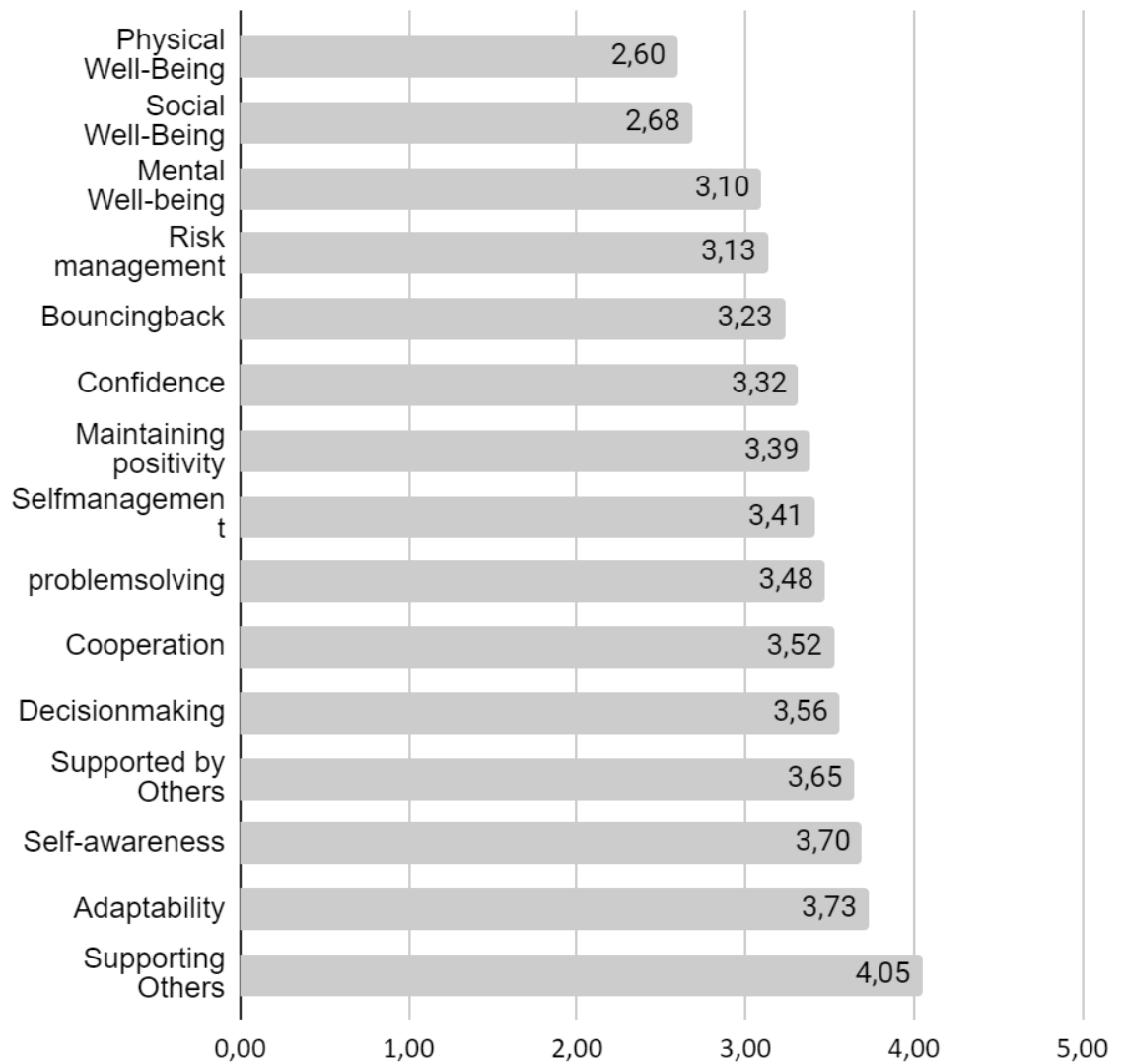


Figure 4.2 : Mean score of each team resilience strategy

As a result of comparing the mean score of each team resilience strategy: The Physical, Social, and Mental Well-Being skills of the individuals show the least contributing resilience skills, while Self-awareness, Adaptability, and Supporting Others show the most contributing ones.

Figure 4.3 presents the mean score of each teamwork challenge factor in the pandemic.

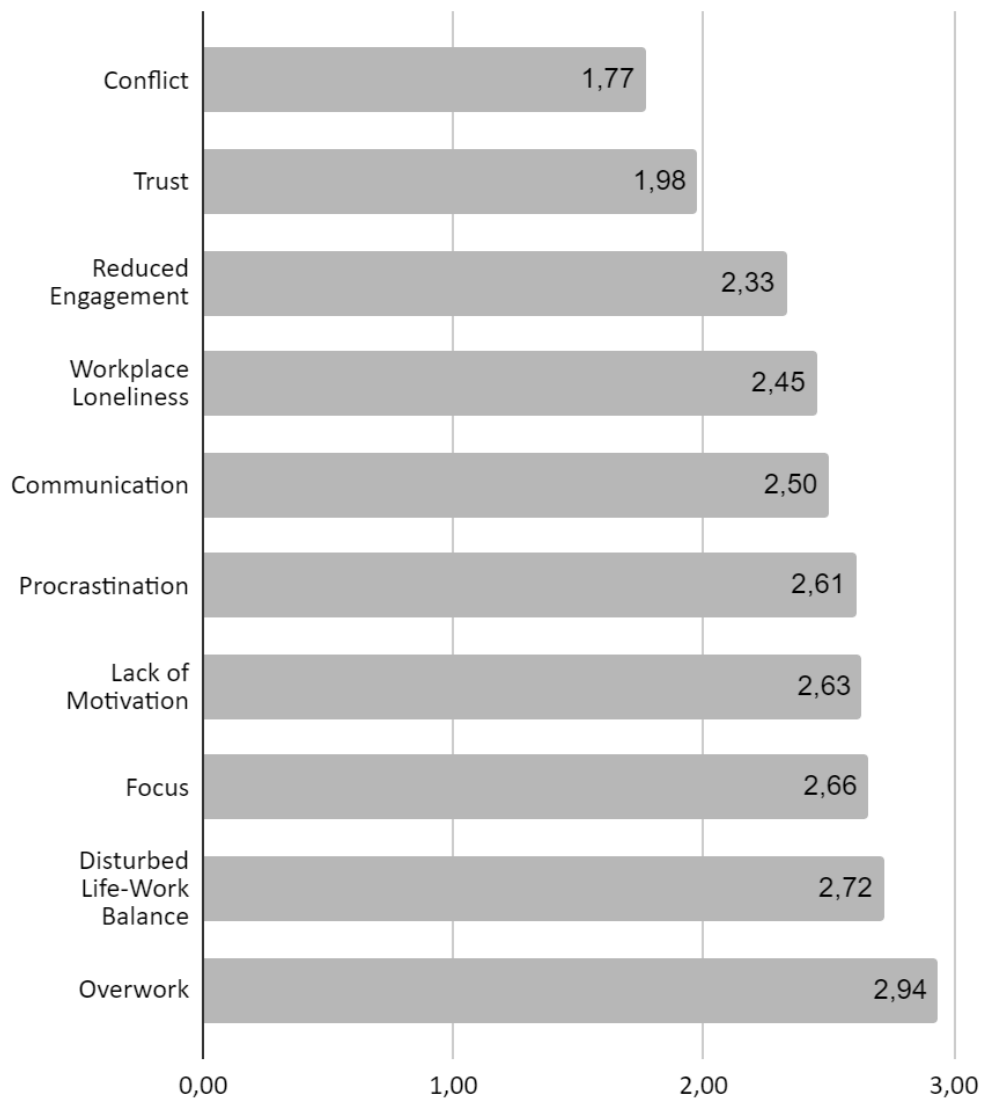


Figure 4.3 : Mean score of each teamwork challenge factor in the pandemic

As a result of comparing the mean score of each teamwork challenge factor in the pandemic: Conflict and Trust cause the least adversities while Disturbed Life-Work Balance and Overwork cause the most ones for construction professionals during the pandemic period.

Figure 4.4 presents the mean score of degree of impact from the pandemic on individual, team, and organizational level.

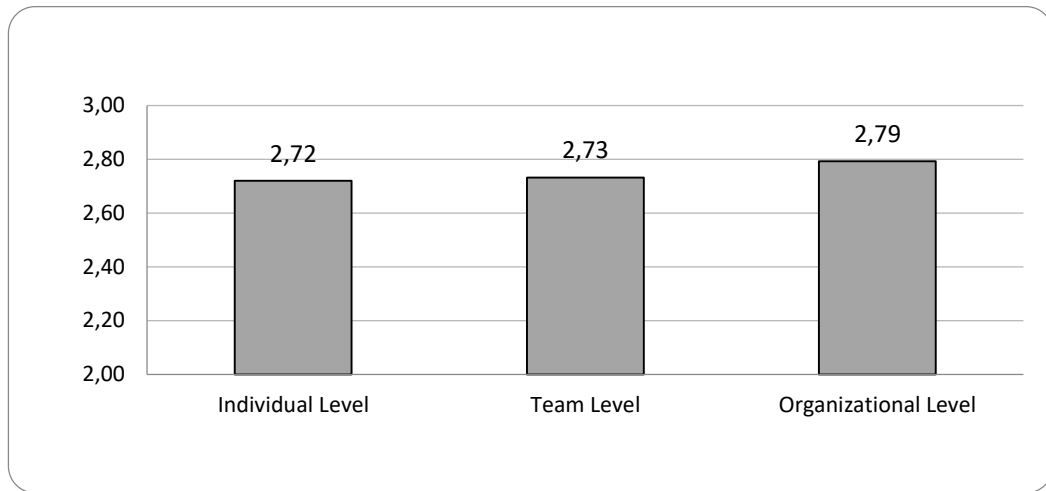


Figure 4.4 : Mean score of impacts from the pandemic on different levels

As a result of comparing the mean score of the pandemic effects on individual, team, and organizational level:

The pandemic had more effects on organizational level comparing to individual and team levels.

Figure 4.5 presents the mean score of each organizational resilience factors.

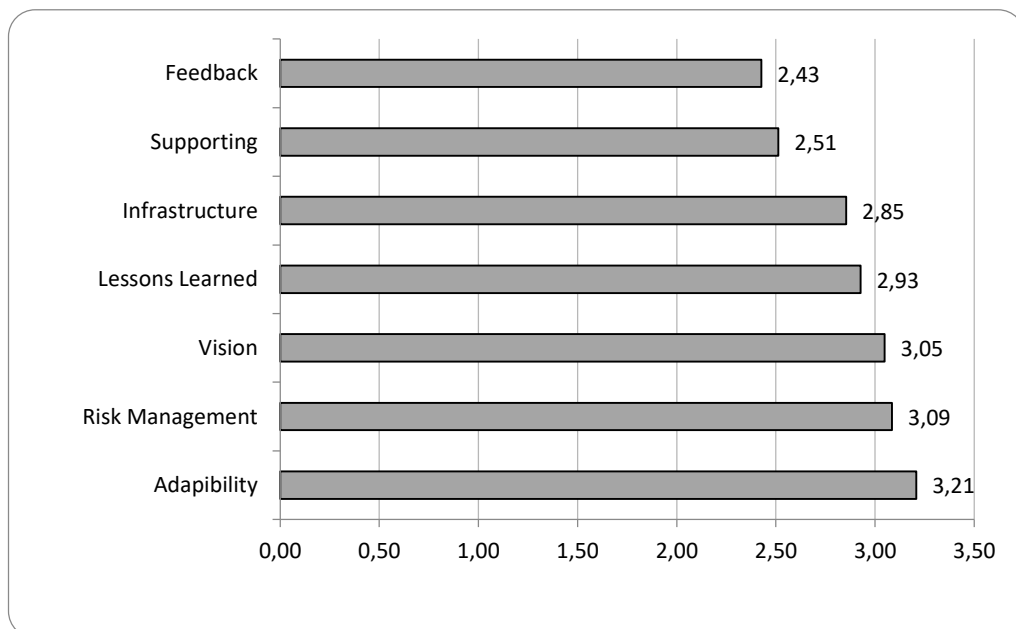


Figure 4.5 : Mean score of each organizational resilience factors

As a result of comparing the mean scores of organizational resilience factors:

Feedback and Supporting factors of the organizations show the least contributing

resilience skills, while Risk Management and Adaptability factors the organizations show the most contributing ones.

Inferential Analysis

In this section, Mann-Whitney U test, Kruskal-Wallis H-test, and correlation analysis were performed to analyze the survey results.

Mann-Whitney U Test

Mann-Whitney U test was applied to the variables to determine the relationship between challenges in the construction industry, resilience strategies and challenges during the Covid-19 pandemic, and the two independent variables as gender, education level, and location. The results of this test are given in the tables below.

The relationship between the challenges in the construction industry, the resilience strategies and the challenges during the Covid-19 pandemic, and the relationship between males and females are shown in Table 4.2.

Table 4.2 : Relationship between gender and teamwork challenges and resilience strategies

Parts	Factors	Mean			SD	Significance p-values
		female	male	total		
Teamwork Challenges	Conflicts	2.84	2.24	2.46	1.12	0.024*
	Uncertainty of Working Hours	2.77	3.00	2.91	1.40	0.47
	Focus	3.61	2.59	2.97	1.31	0.001*
	Uncertainty of Objectives	3.35	2.86	3.05	1.32	0.11
	Trust	3.13	3.00	3.05	1.39	0.67
	Time Pressure	3.13	3.08	3.10	1.45	0.88
	Overwork	3.26	3.10	3.16	1.29	0.54
Resilience Strategies	Communication	3.61	3.02	3.24	1.28	0.043*
	Procrastination	3.48	3.20	3.30	1.35	0.31
	Risk Management	3.10	3.16	3.13	0.90	0.58
	Problem Solving	3.39	3.53	3.48	1.10	0.81
	Cooperation	3.48	3.55	3.52	1.11	0.76
	Decision-Making	3.65	3.51	3.56	1.10	0.64
	Adaptability	3.94	3.61	3.73	1.01	0.21
	Maintaining Positivity	3.39	3.39	3.39	1.15	0.95
	Confidence	3.29	3.33	3.32	1.17	0.96
	Supported by Others	3.87	3.51	3.65	1.14	0.20
	Supporting Others	4.32	3.88	4.05	0.94	0.05*
	Self Awareness	3.94	3.55	3.70	1.06	0.14
	Bouncing Back	3.13	3.29	3.23	1.09	0.60
	Self Management	3.52	3.35	3.41	1.10	0.42
	Social Well-Being	2.81	2.61	2.68	1.28	0.56
	Physical Well-Being	2.65	2.57	2.60	1.20	0.76
	Mental Well-Being	3.13	3.08	3.10	1.17	0.89
Challenges in the Pandemic	Workplace Loneliness	2.97	2.14	2.45	1.31	0.004*
	Communication	3.13	2.12	2.50	1.34	0.001*
	Disturbed Work-Life Balance	3.16	2.45	2.72	1.43	0.030*
	Trust	2.26	1.80	1.98	1.01	0.051**
	Procrastination	2.94	2.41	2.61	1.18	0.045*
	Overwork	3.13	2.82	2.94	1.35	0.305
	Focus	3.19	2.33	2.66	1.42	0.009*
	Conflict	2.00	1.63	1.77	0.86	0.087**
	Reduced Engagement	2.52	2.22	2.33	1.29	0.372
	Motivation	3.19	2.29	2.63	1.23	0.001*

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.1 level.

In line with the information obtained from Table 4.2, the evaluation of teamwork challenges in the industry, resilience strategies, and teamwork challenges in the pandemic according to gender variables are presented under the following headings:

Communication

The application of the Mann-Whitney U test to the "communication" challenges returned a p-value of 0.043, providing sufficient statistical evidence to conclude that communication differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more communication issues than male professionals.

Focus

The application of the Mann-Whitney U test to the "focus" challenge returned a p-value of 0.001, providing sufficient statistical evidence to conclude that focus differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more focusing issues than male professionals.

Conflict

The application of the Mann-Whitney U test to the "conflict" challenge returned a p-value of 0.024, providing sufficient statistical evidence to conclude that conflict differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more conflict issues than male professionals.

Supporting Others

The application of the Mann-Whitney U test to the "supporting" resilience strategy returned a p-value of 0.050, providing sufficient statistical evidence to conclude that support resilience differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals reflect more supporting resilience than male professionals.

Workplace Loneliness

The application of the Mann-Whitney U test to the "workplace loneliness" challenge during the pandemic returned a p-value of 0.004, providing sufficient statistical evidence to conclude that workplace loneliness differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more loneliness in the workplace issues caused by the pandemic than male professionals.

Lack of Communication

The application of the Mann-Whitney U test to the "lack of communication" issue during the pandemic returned a p-value of 0.001, providing sufficient statistical evidence to conclude that lack of communication differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more issues in the workplace caused by lack of communication during the pandemic than male professionals.

Disturbed Work-Life Balance

The application of the Mann-Whitney U test to the "disturbed work-life balance" challenge during the pandemic returned a p-value of 0.030, providing sufficient statistical evidence to conclude that disturbed work-life balance differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more disturbed work-life balance caused by the pandemic than male professionals.

Lack of Trust

The application of the Mann-Whitney U test to the "lack of trust" challenge during the pandemic returned a p-value of 0.051, providing sufficient statistical evidence to conclude that lack of trust differs across both genders at a 10% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more issues in the workplace caused by a lack of trust during the pandemic than male professionals.

Procrastination

The application of the Mann-Whitney U test to the "procrastination" challenge during the pandemic returned a p-value of 0.045, providing sufficient statistical evidence to conclude that procrastination differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more procrastination issues in the workplace during the pandemic than male professionals.

Focus

The application of the Mann-Whitney U test to the "focus" challenge during the pandemic returned a p-value of 0.009, providing sufficient statistical evidence to conclude that focus differs across both genders at a 5% significance level.

Comparing means of the two independents supports the conclusion that female construction professionals experience more focusing issues in the workplace during the pandemic than male professionals.

Conflict

The application of the Mann-Whitney U test to the "conflict" challenge during the pandemic returned a p-value of 0.087, providing sufficient statistical evidence to conclude that conflict differs across both genders at a 10% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more conflict issues in the workplace during the pandemic than male professionals.

Motivation

The application of the Mann-Whitney U test to the "motivation" challenge during the pandemic returned a p-value of 0.001, providing sufficient statistical evidence to conclude that motivational challenge differs across both genders at a 5% significance level. Comparing means of the two independents supports the conclusion that female construction professionals experience more motivational issues in the workplace during the pandemic than male professionals.

The relationship between the challenges in the construction industry, the resilience strategies and the challenges during the Covid-19 pandemic, and the relationship between graduate and undergraduate education levels are shown in Table 4.3.

Table 4.3 : Relationship between education level and teamwork challenges and resilience strategies

Parts	Factors	Mean			SD	Significance p-values
		Undergraduate	Graduate	Total		
Teamwork Challenges	Conflicts	2.31	2.62	2.46	1.12	0.099**
	Uncertainty of Working Hours	2.81	3.02	2.91	1.40	0.516
Resilience Strategies	Focus	2.64	3.32	2.98	1.31	0.018*
	Uncertainty of Objectives	3.05	3.05	3.05	1.32	0.992
	Trust	3.02	3.07	3.05	1.39	0.872
	Time Pressure	3.21	2.97	3.10	1.45	0.456
	Overwork	3.19	3.12	3.16	1.29	0.823
	Communication	3.12	3.37	3.24	1.28	0.468
	Procrastination	3.17	3.45	3.30	1.35	0.380
	Risk Management	3.14	3.12	3.13	0.90	0.505
	Problem Solving	3.43	3.52	3.47	1.10	0.563
	Cooperation	3.40	3.65	3.52	1.11	0.380
	Decision-Making	3.40	3.72	3.56	1.10	0.200
	Adaptability	3.57	3.90	3.73	1.01	0.145
	Maintaining Positivity	3.17	3.62	3.39	1.15	0.072**
	Confidence	3.24	3.40	3.32	1.17	0.524
	Supported by Others	3.52	3.77	3.65	1.14	0.417
	Supporting Others	3.98	4.12	4.05	0.94	0.513
	Self Awareness	3.69	3.70	3.70	1.06	0.900
	Bouncing Back	3.26	3.20	3.34	1.04	0.958
	Self Management	3.29	3.40	3.23	1.09	0.075**
	Social Well-Being	2.81	2.55	3.41	1.10	0.356
Physical Well-Being	2.83	2.35	2.68	1.28	0.050*	
Mental Well-Being	3.21	2.97	2.60	1.19	0.351	
Challenges in the Pandemic	Workplace Loneliness	2.38	2.52	3.10	1.17	0.462
	Communication	2.21	2.80	2.50	1.34	0.022*
	Disturbed Work-Life Balance	2.52	2.80	2.72	1.43	0.208
	Trust	1.79	2.17	1.98	1.01	0.060**
	Procrastination	2.48	2.75	2.61	1.18	0.250
	Overwork	2.86	3.02	2.94	1.35	0.589
	Focus	2.36	2.97	2.66	1.42	0.058**
	Conflict	1.74	1.80	1.77	0.86	0.710
	Reduced Engagement	2.07	2.60	2.33	1.29	0.089**
	Motivation	2.29	3.00	2.63	1.23	0.012*

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.1 level.

In line with the information obtained from Table 4.3, the evaluation of teamwork challenges in the industry, resilience strategies, and teamwork challenges in the pandemic according to educational level variables are presented under the following headings:

Focus

The application of the Mann-Whitney U test to the "focus" challenges returned a p-value of 0.018, providing sufficient statistical evidence to conclude that focus differs across both educational levels at a 5% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more focusing issues than undergraduate-level professionals.

Conflict

The application of the Mann-Whitney U test to the "conflict" challenges returned a p-value of 0.099, providing sufficient statistical evidence to conclude that conflict differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more conflict issues than undergraduate-level professionals.

Maintaining Positivity

The application of the Mann-Whitney U test to the "maintaining positivity" resilience strategy returned a p-value of 0.072, providing sufficient statistical evidence to conclude that maintaining positivity resilience differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals are able to provide more maintaining positivity resilience than undergraduate-level professionals.

Self-Management

The application of the Mann-Whitney U test to the "self-management" resilience strategy returned a p-value of 0.075, providing sufficient statistical evidence to conclude that self-management resilience differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals are able to provide more self-management resilience than undergraduate-level professionals.

Physical Well-Being

The application of the Mann-Whitney U test to the "physical well-being" resilience strategy returned a p-value of 0.050, providing sufficient statistical evidence to

conclude that physical well-being resilience differs across both educational levels at a 5% significance level. Comparing means of the two independents supports the conclusion that undergraduate-level construction professionals can provide more physical well-being resilience than graduate-level professionals.

Lack of Communication

The application of the Mann-Whitney U test to the "lack of communication" challenges during the pandemic returned a p-value of 0.022, providing sufficient statistical evidence to conclude that lack of communication differs across both educational levels at a 5% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more issues due to lack of communication caused by the pandemic than undergraduate-level professionals.

Lack of Trust

The application of the Mann-Whitney U test to the "lack of trust" challenges during the pandemic returned a p-value of 0.060, providing sufficient statistical evidence to conclude that lack of trust differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more issues in the workplace caused by a lack of trust during the pandemic than undergraduate-level professionals.

Focus

The application of the Mann-Whitney U test to the "focus" challenges during the pandemic returned a p-value of 0.058, providing sufficient statistical evidence to conclude that focus differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more focusing issues in the workplace during the pandemic than undergraduate-level professionals.

Reduced Engagement

The application of the Mann-Whitney U test to the "reduced engagement" challenge during the pandemic returned a p-value of 0.089, providing sufficient statistical evidence to conclude that reduced engagement differs across both educational levels at a 10% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more issues due

to reduced engagement in their job during the pandemic than undergraduate-level professionals.

Motivation

The application of the Mann-Whitney U test to the "motivation" challenges during the pandemic returned a p-value of 0.012, providing sufficient statistical evidence to conclude that motivation differs across both educational levels at a 5% significance level. Comparing means of the two independents supports the conclusion that graduate-level construction professionals experience more motivational issues in the workplace during the pandemic than undergraduate-level professionals.

The relationship between the challenges in the construction industry, the resilience strategies and the challenges during the Covid-19 pandemic, and the relationship between local and international construction professionals are shown in Table 4.4.

Table 4.4 : Relationship between location and teamwork challenges and resilience strategies

Parts	Factors	Mean			SD	Significance p-values
		Local	International	total		
Pandemic	Communication	2.64	1.94	2.50	1.34	0.053**
	Procrastination	2.73	2.12	2.61	1.18	0.05*
	Motivation	2.74	2.19	2.63	1.23	0.089**

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.1 level.

Lack of Communication

The application of the Mann-Whitney U test to the "lack of communication" challenges during the pandemic returned a p-value of 0.053, providing sufficient statistical evidence to conclude that lack of communication differs across both local and international professionals at a 10% significance level. Comparing means of the two independents supports the conclusion that local construction professionals experience more issues due to a lack of communication caused by the pandemic than international construction professionals.

Procrastination

The application of the Mann-Whitney U test to the "procrastination" challenge during the pandemic returned a p-value of 0.050, providing sufficient statistical evidence to conclude that procrastination differs across both local and international professionals at a 5% significance level. Comparing means of the two independents

supports the conclusion that local construction professionals experience more procrastination issues in the workplace during the pandemic than international construction professionals.

Motivation

The application of the Mann-Whitney U test to the "motivation" challenges during the pandemic returned a p-value of 0.089, providing sufficient statistical evidence to conclude that motivation differs across local and international professionals at a 10% significance level. Comparing means of the two independents supports the conclusion that local construction professionals experience more motivational issues in the workplace during the pandemic than international construction professionals.

Kruskal-Wallis H-test

The Kruskal-Wallis H-test was applied to analyze the relationship between the independent variable was the operational status of the participants, and the dependent variables were each of the 34 factors, including 9 teamwork challenges, 15 resilience strategies, and 10 teamwork challenges during the pandemic at a 95% confidence level..

Table 4.5 : Nonparametric Kruskal–Wallis H-tests.

Factors	Significance p-values
Uncertainty of Working Hours	0.902
Time Pressure	0.059**
Overwork	0.291
Communication	0.833
Trust	0.261
Procrastination	0.887
Focus	0.319
Conflict	0.91
Uncertainty of Objectives	0.185
Workplace Loneliness	0*
Communication	0.041*
Disturbed Work-Life Balance	0.033*
Trust	0.273
Procrastination	0.102
Overwork	0.17
Focus	0.015*
Conflict	0.386
Reduced Engagement	0.116
Motivation	0.065**
Risk Management	0.309
Problem Solving	0.24
Cooperation	0.227
Decision-Making	0.587
Adaptability	0.218
Maintaining Positivity	0.117
Confidence	0.357
Supported by Others	0.546
Supporting Others	0.236
Self Awareness	0.533
Bouncing Back	0.545
Self Management	0.508
Social Well-Being	0.758
Physical Well-Being	0.758
Mental Well-Being	0.622

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.1 level.

If it was statistically evident that the operational status of the participants relates differently to the teamwork challenges and resilience strategies, the corresponding post-hoc Dunn's statistical test was applied to the set of pairwise comparisons. This additional analysis offered more statistical insight into how each operational status pair interacts differently with teamwork challenges and resilience strategies. The same threshold of significance was used for the post-hoc Dunn's test. If a post-hoc test returns a p-value less than 0.05, it can be concluded that the tested pair of personality types significantly differ in the tested factor. Table 4.6 shows the results of the post-hoc Dunn's statistical test.

Table 4.6 : Post-hoc Dunn’s statistical test for operational status effects

Pairwise Comparisons	Significance p-values					
	Time Pressure	Workplace Loneliness	Communication	Disturbed Work-Life Balance	Focus	Motivation
Field-Office	0.701	0.094**	0.421	0.094**	0.523	0.207
Field-Remote	0.363	0.002*	0.031*	0*	0.182	0.010*
Field-Hybrid	0.060*	0*	0.012*	0.002*	0.043*	0.038*
Office-Remote	0.169	0.166	0.159	0.166	0.036*	0.175
Office-Hybrid	0.013*	0.021*	0.087**	0.021*	0.003*	0.482
Remote-Hybrid	0.329	0.431	0.882	0.431	0.540	0.403

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.1 level.

In line with the information obtained from Table 4.5 and Table 4.6, the evaluation of teamwork challenges in the industry, resilience strategies, and teamwork challenges in the pandemic according to operational differences due to restrictions during the pandemic are presented under the following headings:

Time Pressure

The application of the Kruskal-Wallis H-test to the "time pressure" challenge returned a p-value of 0.059, providing sufficient statistical evidence to conclude that time pressure differs across the operational status of the professionals at a 10% confidence level. The application of post-hoc Dunn’s tests found sufficient statistical evidence at a 90% confidence level to support the following conclusions: P-values of significance were found at the level of 0.060 and 0.013 compared to professionals working as hybrids and those working on the site and working from the office, respectively. Professionals who worked on the site and offices experienced the pressure of time more than those who worked as hybrids.

Workplace Loneliness

The application of the Kruskal-Wallis H-test to the "workplace loneliness" challenge returned a p-value of 0.00, providing sufficient statistical evidence to conclude that workplace loneliness differs across the operational status of the professionals at a 5% confidence level. The application of post-hoc Dunn’s tests found sufficient statistical evidence at a 90% confidence level to support the following conclusions: P-values

of significance were found at the level of 0.094, 0.002, and 0.00 compared to professionals working on the site to those working in the offices, remotely, and as hybrids, respectively. P-value of significance was found at the level of 0.021 compared to professionals working in the offices to those working as hybrids. Professionals who worked remotely and as hybrids experienced workplace loneliness due to the pandemic more than those who worked on the site and from offices.

Communication

The application of the Kruskal-Wallis H-test to the "communication" challenges returned a p-value of 0.041, providing sufficient statistical evidence to conclude that communication issues differ across the operational status of the professionals at a 5% confidence level. The application of post-hoc Dunn's tests found sufficient statistical evidence at a 90% confidence level to support the following conclusions: P-values of significance were found at the level of 0.031 and 0.012 compared to professionals working on the site to those working remotely and as hybrids, respectively. P-value of significance was found at the level of 0.087 compared to professionals working in the offices to those working as hybrids. Professionals who worked remotely and as hybrids experienced communication issues due to the pandemic more than those who worked on the site and from offices.

Disturbed Work-Life Balance

The application of the Kruskal-Wallis H-test to the "disturbed work-life balance" challenges returned a p-value of 0.033, providing sufficient statistical evidence to conclude that disturbance in the work-life balance differs across the operational status of the professionals at a 5% confidence level. The application of post-hoc Dunn's tests found sufficient statistical evidence at a 90% confidence level to support the following conclusions: P-values of significance were found at the level of 0.094, 0.00, and 0.002 compared to professionals working on the site to those working in the offices, remotely, and as hybrids, respectively. P-value of significance was found at the level of 0.021 compared to professionals working in the offices to those working as hybrids. Professionals who worked remotely and as hybrids experienced disturbed work-life balance due to the pandemic more than those who worked on the site and from offices.

Focus

The application of the Kruskal-Wallis H-test to the "focus" challenges returned a p-value of 0.015, providing sufficient statistical evidence to conclude that focusing

issues differ across the operational status of the professionals at a 5% confidence level. The application of post-hoc Dunn's tests found sufficient statistical evidence at a 95% confidence level to support the following conclusions: P-values of significance were found at the level of 0.043 and 0.003 compared to professionals working as a hybrid to those working on the site and in the offices, respectively. P-value of significance was found at the level of 0.036 compared to professionals working remotely to those working in the offices. Professionals who worked remotely and as hybrids experienced focusing difficulties more than those who worked on the site and from offices.

Motivation

The application of the Kruskal-Wallis H-test to the "motivation" challenge returned a p-value of 0.065, providing sufficient statistical evidence to conclude that motivational issues differ across the operational status of the professionals at a 10% confidence level. The application of post-hoc Dunn's tests found sufficient statistical evidence at a 95% confidence level to support the following conclusions: P-values of significance were found at the level of 0.010 and 0.038 compared to professionals working on the site to those working remotely and as hybrids, respectively. Professionals who worked remotely and as hybrids experienced motivational difficulties more than those who worked on the site.

Correlation Analysis

In line with the survey results of the construction industry professionals, correlation analysis was performed to see the relationship between resilience strategies and the difficulties experienced in teamwork in the pandemic. As a result of the analysis performed at the 95% level, the results with a p-value less than 0.05 were indicated as significant. Table 4.7 shows the results of the correlation analysis.

Table 4.7 : The correlations between resilience strategies and the team challenges in the pandemic (at the 0.05 level)

Resilience Strategies	Pandemic Challenges	Significance Factor
Cooperation	Disturbed Life-Work Balance	0.034
Adaptability	Reduced Engagement	0.006
Maintaining Positivity	Conflict	0.046
	Reduced Engagement	0.011
	Motivation	0.004
Being Supported	Conflict	0.028
Supporting Others	Workplace Loneliness	0.042
	Communication	0.047
Bouncing-back	Reduced Engagement	0.011
	Motivation	0.000
Self Management	Reduced Engagement	0.010
	Motivation	0.004
Social Well-being	Motivation	0.029
Physical Well-being	Overwork	0.002
	Motivation	0.007
Mental Well-being	Workplace Loneliness	0.030
	Overwork	0.028
	Reduced Engagement	0.006
	Motivation	0.005

In line with the information obtained from Table 4.7, the correlations between resilience strategies and the team challenges in the pandemic are presented under the following headings:

Cooperation

According to correlation analysis, 'cooperation', one of the resilience strategies provided by teams against difficulties, and 'disturbed life-work balance' experienced in the pandemic have a correlation significance of 0.034.

Adaptability

According to correlation analysis, 'adaptability', one of the resilience strategies provided by teams against difficulties, and 'reduced engagement' experienced in the pandemic have a correlation significance of 0.006.

Maintaining Positivity

According to correlation analysis, 'maintaining positivity', one of the resilience strategies provided by teams against difficulties, and 'conflict', 'reduced engagement', and 'lack of motivation' experienced in the pandemic have correlation significances of 0.046, 0.011, and 0.004, respectively.

Being Supported

According to correlation analysis, 'receiving support from other team members', one of the resilience strategies provided by teams against difficulties, and 'conflict' experienced in the pandemic have a correlation significance of 0.028.

Supporting Others

According to correlation analysis, 'providing support to other team members', one of the resilience strategies provided by teams against difficulties, and 'workplace loneliness' and 'lack of communication' experienced in the pandemic have correlation significances of 0.042 and 0.047, respectively.

Bouncing-back

According to correlation analysis, 'bouncing back', one of the resilience strategies provided by teams against difficulties, and 'reduced engagement', and 'lack of motivation' experienced in the pandemic have correlation significances of 0.011 and 0.000, respectively.

Self-management

According to correlation analysis, 'self-management', one of the resilience strategies provided by teams against difficulties, and 'reduced engagement' and 'lack of motivation' experienced in the pandemic have correlation significances of 0.010 and 0.004, respectively.

Social Well-being

According to correlation analysis, 'social well-being', one of the resilience strategies provided by teams against difficulties, and 'lack of motivation' experienced in the pandemic have a correlation significance of 0.029.

Physical Well-being

According to correlation analysis, 'physical well-being', one of the resilience strategies provided by teams against difficulties, and 'overwork' and 'lack of motivation' experienced in the pandemic have correlation significances of 0.002 and 0.007, respectively.

Mental Well-being

According to correlation analysis, 'mental well-being', one of the resilience strategies provided by teams against difficulties, and 'workplace loneliness', 'overwork', 'reduced engagement', and 'lack of motivation' experienced in the pandemic have correlation significances of 0.030, 0.028, 0.006, and 0.005, respectively.



5. CONCLUSIONS AND DISCUSSION

The purpose of this thesis research is to examine how to develop the team resilience of construction project professionals by exploring the team challenges in the sector and the team challenges experienced during the Covid-19 pandemic. Accordingly, firstly, literature was reviewed to identify team challenge factors in the construction industry, team resilience and resilience strategies, and teamwork challenges experienced in the pandemic era. With a comprehensive literature review, challenge factors and resilience strategies were identified.

A questionnaire survey method is selected to collect data. After the pilot survey and with the request of the pilot survey participants, the revised survey was delivered to the survey participants via online access. The reliability of the survey results was tested after the data collection. Then, data were analyzed using the SPSS package programme. First, descriptive analysis was used and the mean scores were presented. Second, Mann-Whitney U-test and Kruskal-Wallis H-test were performed to identify significant differences between the variables. Third, the correlation between challenge factors and resilience strategies was analyzed and presented. It is determined that there is a relationship between team challenges experienced in the pandemic due to operational status changes. Moreover, post-hoc Dunn's statistical test was applied to the set of pairwise comparisons to compare each operational status of professionals during the pandemic with each other. In line with this evidence, the following are suggestions and the relationship between each team challenges in the pandemic and resilience strategies:

Even if the pandemic had effects on many all levels, organizations were affected from the pandemic more than teams and individuals. Therefore, developing organizational resilience may secure businesses from adverse events such as the pandemic. Organizational adaptibility and risk management during the pandemic showed the most contributing resilience factors whereas getting feedbacks from employees and supporting their training showed the least contributing ones.

It has been determined that 'providing support to other team members', 'workplace loneliness' and 'lack of communication' experienced in the pandemic provided a significant statistical evidence. In works and projects involving teamwork, the interaction and communication of individuals with each other are very important in terms of developing resilience (Massari et al., 2021). Moreover, being able to socially interact with other colleagues at some level also reduces feeling isolated or excluded (Kirkman et al, 2002). The 'lack of communication' and 'workplace loneliness' experienced by the construction industry professionals during the pandemic required a support network to develop resilience towards the challenges.

According to the correlation analysis, 'adaptability' and 'reduced engagement' experienced in the pandemic provided a significant statistical evidence. In order to adapt, individuals need to be constantly open to learning and in harmony with unexpected effects (Hollenbeck & McCall, 1999; Giezen et al., 2015). However, as individuals' engagement in their jobs decreased during the pandemic, it negatively affected their ability to adapt to changes and therefore, teams' resilience. Therefore, 'reduced engagement' challenge required team members to develop 'adaptability' to become more resilient to the challenges.

With the application of correlation analysis, 'receiving support from other team members' and 'conflict' experienced in the pandemic provided a significant statistical evidence. In team-related works and projects, it is important to have continuous professional interactions and social networking (Bennett et al., 2010). Moreover, being encouraged and supported to think positively can reduce the negative effects of adversities. Therefore, 'conflict' issues between co-workers required a support network to develop resilience towards the challenges.

The correlation analysis determines that 'cooperation' and 'disturbed life-work balance' experienced in the pandemic provided a significant statistical evidence. In teamwork, a coordinating mechanism is required for its members to work in harmony. Moreover, coordination includes communication and interactions to enable team members to complete tasks. (Tian et al., 2015). However, due to restrictions because of the health concerns during the pandemic, physical interactions in the workplace reduced and people started working remotely. Consequently, the sudden requirement for adjusting to new working schedules may have created a disturbance

in life-work balance. Moreover, both uncertainties at work and in life required attention, resulting in professionals experiencing 'disturbed life-work balance' during the pandemic. Therefore, the challenge of 'disturbed life-work balance' required team members to develop 'cooperation' to become more resilient to the challenges.

According to the correlation analysis, 'self-management' and 'reduced engagement' and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. As much as teams are formed by individuals with expertise for a common goal, ultimately individuals' motivation and focus have importance to the team's success. Moreover, the uncertainties during the pandemic may have created virtual teams experiencing disengagement toward their job. Distractions that come with working remotely can be challenging for individuals to focus on their work (Ogunnusi et al., 2021). Consequently, 'reduced engagement' and 'lack of motivation' challenges experienced during the pandemic required team members to develop 'self-management' to become more resilient to the challenges.

It has been determined that 'maintaining positivity' and 'conflict', 'reduced engagement', and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. As an aspect of team resilience, maintaining a positive attitude to adapt better to adverse situations is essential at the team level as well as at the individual level. Teams like individuals have moods and by increasing positive team mood, they also increase team resources to support the team's resilience during adversities (Fredrickson & Losada, 2005). However, during the pandemic, construction professionals experienced difficulties such as 'conflict' issues, 'reduced engagement', and 'lack of motivation' challenges to maintain a positive attitude. Therefore, teams were required to develop 'maintaining positivity' to become more resilient to the challenges.

With the application of correlation analysis, 'bouncing back' and 'reduced engagement', and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. An aspect of resilience can be defined as 'bouncing back' from stressful experiences and adversities (APA, 2013). Due to the challenges of the pandemic, individuals experienced a lack of engagement in their job and a decrease in their motivation. From the external stress factors and discomforts experienced during the pandemic, individuals needed a quick recovery to return to

their normal operational status. Thus, teams were required to develop 'bouncing back' to become more resilient to the challenges during the pandemic.

The correlation analysis determines that 'mental well-being' and 'workplace loneliness', 'overwork', 'reduced engagement', and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. As an aspect of well-being, 'mental well-being' has great importance on the individual level which requires mental stamina to be in a healthy mood. Otherwise, interdependently coordinating team members with low 'mental well-being' can affect the group resilience in a negative way (MacDonald, 2005; Tonkin et al., 2018). Mental well-being also determines individuals' attention, memory, problem-solving, judgment, and decision-making (Dietz et al., 2017). Moreover, due to the challenges team members experienced during the pandemic such as 'workplace loneliness', 'overwork', 'reduced engagement', and 'lack of motivation' required individuals to develop 'mental well-being' that could support the team's resilience and become more resilient to the challenges in the pandemic.

According to the correlation analysis, 'social well-being' and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. As an aspect of well-being, 'social well-being' can be defined as the social state of relationship with society and community. Moreover, social coherence helps create meaning in individuals' life psychologically and socially healthy individuals can perceive their life as more meaningful which could motivate them (Keyes, 1998). However, due to social restrictions during the pandemic, individuals experienced 'lack of motivation' which required teams to develop 'social well-being' to become more resilient to the challenges.

The results show that 'physical well-being' and 'overwork' and 'lack of motivation' experienced in the pandemic provided a significant statistical evidence. As an aspect of well-being, 'physical well-being' can be defined as the healthy and safe state of physical outlook. As organizations are obligated to provide physical safety for their employees under occupational health and safety laws. However, due to restrictions and 'overwork' and 'lack of motivation' challenges during the pandemic, many individuals experienced difficulties to keep their physical activities with their disturbed work-life balance. Therefore, increased workload on individual levels and

health concerns in the pandemic required teams to develop 'physical well-being' to become more resilient to the challenges.

Other resilience strategies: risk management, confidence, problem-solving, decision-making, and self-awareness were not correlated with team difficulties experienced during the pandemic.

In conclusion, statistically significant correlations were found between team challenges experienced in the pandemic and team resilience strategies. These findings are an important contribution to developing team resilience of construction industry professionals and reducing team challenges and improving teams' productivity. Therefore, developing team resilience can also lead to developing organizational resilience. By focusing on the human side, this thesis research encourages thinking beyond the iron triangle of time, cost, and quality in the construction industry. Another contribution of this thesis is that it includes strategies to increase team resilience by inferencing from experiences in team challenges encountered in the pandemic.

This study is limited to construction sector professionals. In future research, the approach in this thesis research can be examined within the context of professionals in other disciplines. Also, this approach can be projected beyond the construction industry to other industries.



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APPENDIX

Survey Questions

Personal Information

* Required

1. What is your gender? *

Mark only one oval.

- Female
- Male
- I do not want to specify

2. What is your educational level? *

Mark only one oval.

- Undergraduate
- Graduate
- PhD

3. What is your field of work? *

Mark only one oval.

- Private Sector
- Public Sector
- Academia

4. Where is your work located? *

Mark only one oval.

- Turkey
- Abroad

5. What is your profession? *

Mark only one oval.

- Civil Engineer
- Architect
- Others

6. What is your professional role? *

Mark only one oval.

- Project Manager
- Construction Supervisor
- Team Manager
- Team Member
- Others

7. What is your working experience? *

Mark only one oval.

- 0-2 Years
- 3-5 Years
- 6-10 Years
- 11-15 Years

8. How did you work during the pandemic? *

Mark only one oval.

- Remote Working
- In the office
- In the field
- As hybrid

9. Evaluate the challenging factors in your teamwork experiences by giving points between 1-5 (1= strongly not challenging, 2= not challenging, 3= neutral, 4= challenging, and 5= strongly challenging).

Mark only one oval per row.

	1	2	3	4	5
Uncertainty of working hours of the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time pressure on the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication issues between team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trust issues between team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Procrastination of the works in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focusing issues of the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conflicts between team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uncertainty of team objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overworks in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Evaluate your level of impact from Covid-19 by giving points between 1-5 (1 = strongly not been affected, 2= not been affected, 3= neutral, 4= somewhat been affected, 5 = strongly been affected).

Mark only one oval per row.

	1	2	3	4	5
At the individual level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At the team level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At organizational level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Evaluate your team resilience strategies during the pandemic by giving points between 1-5 (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree).

Mark only one oval per row.

	1	2	3	4	5
I was able to provide problem-solving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to cooperate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to manage risks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to provide efficient decision-making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to bounce-back from difficulties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to adapt to changes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to maintain positivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to improve my confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to receive support from my teammates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to support my teammates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to improve my self-awareness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to improve my self-management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to maintain my social life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to maintain my physical activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to maintain my mental well-being	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Evaluate the challenging factors in your teamwork experienced during the pandemic by giving points between 1-5 (1= strongly not challenging, 2= not challenging, 3= neutral, 4= challenging, and 5= strongly challenging).

Mark only one oval per row.

	1	2	3	4	5
I experienced loneliness in the workplace due to restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced communication issues between team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced disturbed in my life-work balance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced lack of trust between team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced procrastination of works in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced increase in my workload in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced lack of focus in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced conflicts in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced decrease in my engagement to my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced decrease in my motivation in the team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Evaluate the organizational resilience factors during the pandemic by giving points between 1-5 (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree).

Mark only one oval per row.

	1	2	3	4	5
Working infrastructure (internet access, equipment, etc.) was provided by the institution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The institution quickly adapted to the new working condition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feedback (satisfaction, requests, etc.) methods such as surveys were applied to the employees by the institution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The institution provided the necessary training (online study trainings, etc.) support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The institution preserved the vision during the pandemic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The institution managed the pandemic well	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The institution has learned from the mistakes in the pandemic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

