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Title in English

**Agail project management style for infrastructure
designs in construction plans for Neom project in
Saudi Arabia.**

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CHAPTER 1: INTRODUCTION

The agile project management model as a flexible approach that addresses the changing requirements and priorities, along with the stress on iterative development, is universally appreciated among different industries across the country. Nonetheless, it is in the construction industry that this very technology is almost untapped in, specifically in the case of multi-sectoral projects like the Neom in Saudi Arabia (Carey, Nereim, & Cannon, 2017). The Neom project is an undertaking with a vision to embody a smart city of the future by applying global practices in sustainability. This vision translates into a number of complex undertakings that evenly capture opportunities and challenges. Traditional construction project management methodologies have usually problems in managing complex fields such as solving SOSAPs, time constraints, and open environments. Agile project management offers a different environment in which dialogue, customer contentment, and capability to adapt to changes maintain priority over meticulous planning and records. Employing Agile principles within infrastructure design frameworks for the Neom construction layouts can probably improve project outcomes through the facilitation of innovations, risk reduction, and all of the project members' engagement. Through the division of large projects into smaller procedures that can be completed step by step and the incorporation of constant response to feedback or possible changes in the project requirements, Agile methodologies can make possible the design of infrastructure that meet the Neom's changing and diverse needs (Buller, 2017).

Problem Statement:

Adaptation of Agile approach to the construction sector and people-centered projects like Neom has advanced in software development as well as other various industries, but the deployment of the Agile methodology in the mega-projects sector still has several challenges that are not predictable. Another key issue is that in the majority of the construction industry, the levels of management and contractual terms are more rigid and not the same with Agile as the most significant element of its management system. On the other hand, Neom's project can be likened to a chess game full of intermediate challenges (Dickinson, 2017). Some of the main challenges include coordinating the various stakeholders, managing the various dependencies that affect the different components of infrastructure, adhering to a strict standard of quality and safety. The strict regulatory ecosystem in Saudi Arabia brings forth another catch, forcing legal and compliance matters to be simultaneously considered while Agile implementation is taking place. Also, cultural factors (e.g. dislike of changes and preferring of history-oriented decision-makings) can make teams stakeholders to turn to the Agile methodology. The absence of codified guidelines and standard frameworks for embedding Agile principles in construction projects is yet another cause of this complex process implementation. To successfully address these challenges and uncertainties, one has to thoroughly understand how Agile principles work, can be used in the construction industry, and whether they meet the requirements of the Neom project. It is expedient to investigate the

probable pros, weaknesses, and temporary conditions with regards to using of Agile project management for infrastructure designs in construction programs of Neom. Consequently, this dissertation intends to give an analysis and recommendations for those who are in charge of the project, stakeholders, and the policymakers who are in big construction project environment (Discover Neom, 2017).

Study Purposes:

The fundamental objective of this investigation will be to determine Agile project management governing principles and infrastructure styles which can be applicable for Neom project in construction industry of the Kingdom of Saudi Arabia. This research aims at exploring how Agile principles can be tailored and employed to suit the special dimensions and obstacles of such mega-projects as, make Neom a case in point, to improve final outcomes of project, innovate and push the stakeholder's construction collaboration forward (EDB, 2017). The study aims to determine the viability of implementing Agile project management strategy in a construction environment that is typically defined by the presence of a rigid hierarchical structure and formal contractual framework. It is the research purpose to study how Agility does coexist with routine project management approaches and current contractual arrangements. Potential barriers to adoption will be also identified as well as the strategies for overcoming them (Ereli & Karasik, 2017).

Through a qualitative analysis of already conducted case studies, interviews to those who are experts in the industry and, lastly, a literature review, the research plan will point to what best practices are, and what the practical considerations are when dealing

with Agile project management in construction plans of Neom (Estimo, 2016). Also, another goal that this research is to examine inter alia, cultural factor, regulatory requirements and other contextual factors that influence Agile adoption and deployment in Saudi Arabian construction sector. Through the investigation of whether the cultural values, legal frameworks, and governing aspects of the decision-making processes and stakeholders in the On Air project are the obstacles or the proper drivers of Agile adoption, the study intends to offer some insights into the cultural and institutional barriers for Agile adoption in the On Air project context. Additionally, the work will be aimed to contribute the accumulated background information on Agile techniques at the construction industry by giving the empirical facts and the practical findings. The study came up with integrated research by making a qualitative synthesis from secondary research, case studies and expert interviews. Thence, it is vital for the research to be well-aware about the benefits, disadvantages and best practices of Agile methodologies in infrastructure design projects for smart cities like Neom (Gavril et al., 2017).

Study Questions:

1. How do Agile principles suit the unique challenges of infrastructure designs for mega-projects like Neom in Saudi Arabia's construction industry?
2. What are the main barriers to adopting Agile methodologies for the Neom project, considering cultural, regulatory, and contractual factors?
3. What evidence supports Agile's effectiveness in construction projects, particularly in managing dynamic requirements and enhancing stakeholder collaboration?

4. What are the practical strategies for implementing Agile in Neom's infrastructure design, considering the specific context of the Saudi Arabian construction industry?

Research Aim:

The purpose of this study is to establish whether Agile project management approach can be successfully applied in the delivery of infrastructure projects for the Neom initiative, a vision of the public investment fund of Saudi Arabia's construction sector. This paper seeks to offer a medium to base future discussions on cost effective, flexible and on time large construction projects by touching on the challenges, opportunities and practical limitations (Hohan, Weber, & Rizea, 2014).

Research Objectives:

1. To consider how Agile principles can tackle the infrastructural design challenge of mega projects like Neom for the developments in the construction major industry of Saudi Arabia.
2. To find the most important obstacles to implementing Scrum and Kanban for Neom, and this in light of cultural, bureaucratic, and contractual issues.
3. To consider the significance and evidence of agile methodology being used for construction projects, particularly when it calls for dynamic requirements implementation and stakeholder collaboration.
4. To include the Agile approach in Neom's infrastructure design by taking into consideration the prevailing context of the Saudi Arabian construction sector.

Research Hypotheses:

Hypothesis 1:

Given this, the introduction agile principles of project management help to streamline the infrastructure design process for the Neom project in Saudi Arabia, with a high degree of flexibility and adaptability, leading to improved project outcomes and stakeholder satisfaction. This hypothesis entails that Agile methodologies which are combining the iterative and collaborative nature of the approach will allow the project teams to act in such a way that there will be a higher possibility of them responding to changing needs as well as risks mitigation. Moreover, the infrastructure solutions will be adopted in a pace in Line with the changing requirements of the Neom project (IMF, 2017). The agile approach has gained the reputation for dealing with the problem of managing knowledge-based projects in an ever-changing environment through providing an iterative development, regular stakeholders' involvement and adaptive planning. Neom project, which is thought to be the ideal and sustainable city formation in Saudi Arabia, show that the application of Agile principle in design of infrastructure is worth looking at. Dividing big projects into much smaller feasible accomplishments can continuously involve the opinion of the stakeholders, as well as help a project to be delivered on time. With these ideas in mind, the Agile methodologies assist the infrastructure of the Neom project to constantly adapt moving on solving the emerging problems that arise. Thus, the Agile project management concepts which impart adaptability in the project team to uncertainties; analyze the changes to more likely results and better stakeholder satisfaction will be provided through this hypothesis (Ionescu, Ceausu, & Ilie, 2018).

Hypothesis 2:

Cultural factors, for example, the reticence to change and decision making can be arranged in hierarchical way form very significant obstacles to the implementation and implementation of Agile method (Agile project management practices) for the Neom project. Based on this hypothesis, diverse culture and organizational structure among Saudi Arabian construction industry can act as the obstacles to the establishment of Agile principles, which in addition to tailored strategies expects interventions to garner the influencers' buy-in and overcome the reluctance to change (Kelly & Hubbard, 2017). Through the mediation of cultural traits (or social norms and values), cultural factors take part in the emergence of organization-specific behavioral patterns and managers' performance techniques used during the Neom project implementation. Unlike in a rigid hierarchical structure of Saudi Arabia, the infusion of Agile methodology can be met with resistance from traditionalists whose mindset may be accustomed to strict and rigid paradigms. The following hypothesis expects that context dependence to Agile adoption will have been solved by the development proactive effort which will be tasked with the creation of a culture of collaboration, empowerment, and continuous improvement in the project teams. Through information sharing, joint governance, and mutuality in failure and success, organizations will be able to embed themselves into an environment which is compatible with Agile procedures and which cross-culturally absorbs change (Kingdom of Saudi Arabia, 2017).

Hypothesis 3:

Operational complications and the contractual framework of Saudi Arabia will act as a number of challenges for deployment of Agile project management in the setting of Neom project, influencing the governance of projects, managing of risks and meeting legal requirements (Korybko, 2017). We expect that teaming with the compliance body and customers is going to be among the key tasks that demand from Agile adaptation to all local legislature, standards, and the clients' code of practice. Compliance with regulatory requirements and contractual terms in construction sector definitely supports timely completion of the project reducing risks and ensuring the interests of all other stakeholders involved in the process. Nevertheless, the frequently encountered overly rigid regulation in the Kingdom of Saudi Arabia might be challenging for the Agile project management engaged as this approach focuses on flexibility, adaptability, and iteration. The crux of this predication is that team projects should not only address regulatory barriers and contractual infrastructure successfully, but also do so harmonizing the Agile principles of management. It is extremely important for incorporating regulatory implications to Agile planning and decision-making processes in the energy sector. This will not only reduce the possibility of the risks but also will allow to develop these practices within the regulations of the Saudi Arabian construction industry (Lemaignan et al., 2017).

Hypothesis 4:

Using the solutions of Agile management and considering the problems and the limitations at the same time can improve the innovation process, and make to project in progress be more efficient at the end, and bring about the closer cooperation among the

participants. This argument is based on the understanding that Agile methodologies not only open up room for expression but can also improve performance and ensure that value is delivered in a continuous fashion, making more possible for Neom envisioning a prosper and leading sustainable and futuristic city (Leclerc, 2016). The implementation of Agile Project Management (APM) in the Neom Project is not an easy job. Nevertheless, the core benefits (like the ones of APM) in the promotion of innovation, efficiency and collaboration in the project should not be disregarded. This idea entails the creation of an environment that supports exploration, learning and flexibility, thus allowing the organizations to extract the top-notch advantages of Agile project management and assist the Neom project in the development of infrastructural solutions that adapt to the ever-changing needs. Through fostering cross-functional approach, the team members coming together in a single performer, team, made a decision data-driven, and seeking feedback from the stakeholders, project team members can have the culture of continuing improvement and innovation that makes Neom's "blueprint for a better world" by realizing as a true sustainable city (Lin, 2016).

Theoretical Model:

Agile project management can be seen as a new project management philosophy based on noble principles and leaving plan-driven, schedule-oriented approaches behind with its flexibility, collaboration, and iterative development. Agile (or Agile) methodologies have become very popular in software development as well as in other industries. Nonetheless, transferring their application to the construction sector, and more particularly in the case

of projects of such a large magnitude as the Neom project in Saudi Arabia, is an intricate task that requires a deep analysis of the present context and available resources. To provide descriptions for what Agile implementation in infrastructure creation of the Neom project might involve, a theoretical model can be designed withdrawing on such theories as project management, organizational behavior, and innovation (Mairs, 2017).

1. Agile Project Management Framework:

In the middle of the theory model is a framework of Agile project management that has been in our inventions in attend to the needs and restrictions of the construction industry. it is a characteristic of this framework that centers on main Agile principles including iterative development, constant stakeholder engagement, and an amendment of the design planning the Neom project requires. This methodology, having drawn its inspiration from the Scrum and Kanban methodologies which we already know of, is an elaborate approach used in organizing project activities handling project deliverables and responding to changing customer needs (Mellahi, Frynas, & Finlay, 2011).

2. Organizational Culture and Leadership:

The organization culture and leadership foster the adoption and implementation of Agile frameworks as a core constituent of a project management system. The model presents the practical approach which incorporates the findings of the theory of organizational behavior by taking into consideration aspects like resistance to changes, hierarchical decision making, and risk avoidance that might hinder the embrace of Agile methodology by some of the construction firms participating in the Neom project. The key role of

leadership, which guarantees cultivating an environment of collaboration, empowering a team, and embracing creativity, is involved in the problem-solving process of cultural challenges and Agile transformation execution (N.A., 2017).

3. Stakeholder Engagement and Collaboration:

It is of paramount importance that any project, including large scale construction as in the context of the Neom project sustain close interactions with stakeholders and partners for it to succeed. A theoretical construction is the core of this model. It promotes involving key players from various backgrounds like government agencies, local inhabitants, and international investors in the project at all of its phases. The engagement of all stakeholders in the early stages and throughout the whole process of the project promotes the alignment of the project objectives, gathering of valuable feedback, and trust and transparency, these three principles are central for overcoming the challenges as well as delivering a successful infrastructure design (Nereim & Shahine, 2017).

4. Project Governance and Risk Management:

Strong governance and risk management are essential factors that should be taken into account to avoid the failures made during the projects and thereby reach the targets of Agile project management in construction. The Theoretical Model blends the theories of project management to create a plan that directs the governance of the decision-making process, risk management according to the unstable and hazardous nature of constructions like the Neom. Through a well defined role and responsibilities, constantly active communication leading channels, and moreover proactively embedded identifying

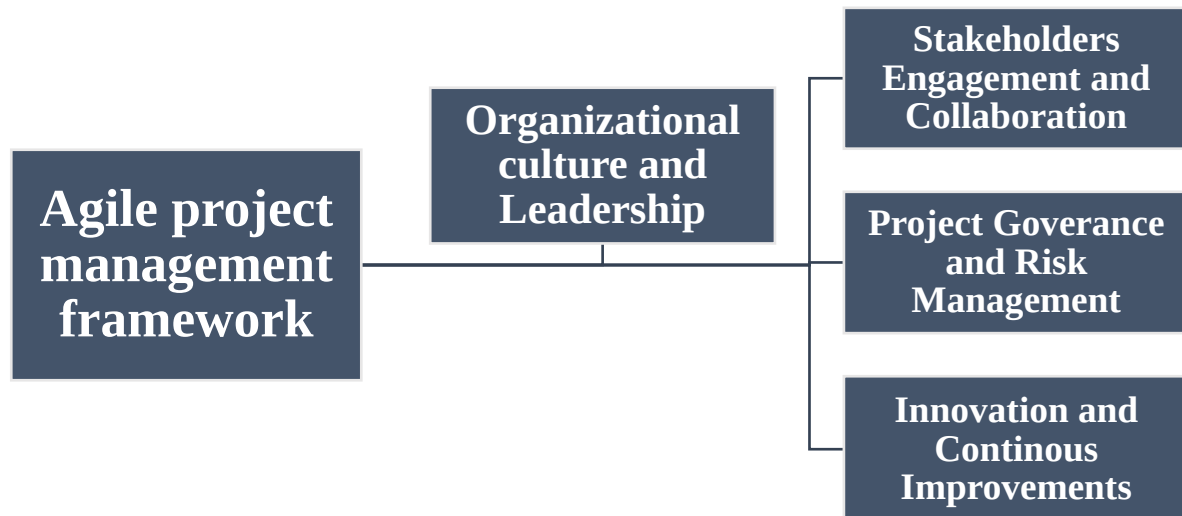
and managing risks, project teams can greatly enhance transparency, accountability, and resilience of projects (Nonneman, 2017).

5. Innovation and Continuous Improvement:

Agile methodologies are encouraging to innovation and continuous improvement cultures, which are indispensable ingredients for capable organizational growth in construction sector. Our conceptual model has been developed using notions from innovation management theory to create an environment that permits invention, trying and learning among project teams. Through promoting independent work, based on real data, and providing an atmosphere where staff feels comfortable to try and yes-fail, organizations get a possibility to be innovative and strategic to assume Neom unique peculiarities (Randow & Look, 2017).

6. Performance Measurement and Evaluation:

Finally, the theoretical model lays stress upon the performance measurements and testing to evaluate the performance of Agile PM practices and continued enhancement of dev team performance. Reference principles of performance management theories, and create efficient KPIs and evaluation in which the Neom project is the main focus and priority (Torchia & Rashad, 2017).



Graph: Agile Project management framework (Self-Sourced)

CHAPTER 2: LITERATURE REVIEW

Introduction:

The literature review plays a key role in the research, it presents a complete abstract of the published studies, containing theories, existing knowledge and the research's topic. This research that will be done specially focuses on Agile project management techniques in the construction industry, in which the case study of this Neom project in Saudi Arabia will illustrate the application of these methods will be analyzed and examined (Olaru et al., 2017). This will be follow by the literature review, which aims to summarize and evaluate existing scholarship on Agile project management, construction project management, and related areas. Agile project management had an emergence in various business sectors having a story of software development as a cradle, but then developing into others such as construction. The main pillars of Technology Agile, for instance, like iterative development, continuous stakeholders' involvement, and adaptive planning, may help solve the specific problems related to construction projects including multiscale requirements, time pressures and emergent environments. Although using Agile approach in the construction sector, particularly on large-scale projects such as Neom, poses the need for close examination of the surrounding environment, organizing issues, and project-specific problems, it remains an effective strategy (IBRD/WB, 2011).

The literature review will initiate with a general introduction to Agile project management principles and their development process, pinpointing the major legalistic concepts and components as well as project management frameworks underlying the agile practice (Wald, 2017). Through a close scrutiny of pivotal works and revolutionary

studies on the field of Agile project management, the paper will establish a theoretical setting for unraveling the fundamental principles and key features of Agile procedures, and their relevance for the unfolding of construction works. This section will be followed up with the literature review that tackles the existing practices of construction project management, concentrating on old methodologies, like the waterfall model, and their inability to address the challenges of construction project including the complexities and uncertainties that are involved. Along with this, the stage of literature review will investigate about empirical investigations and training analyzes that have already analyzed the application of Agile project management in construction projects. Construct by combining findings from early studies the review will elaborate on the effectiveness, advantages and issues connected with adopting Agile approach in project contexts, such as the benefits in terms of project outcomes, satisfaction of stakeholders, metrics etc. Further, the literature review will dwell on the generalized issues and the opportunities confronted by the Neom project mega-project of Saudi Arabia. The aim of this review is to look at the case studies, industry reports, and scholarly articles that will focus the management of mega projects in search for the unique features and complexity of managing these kinds of massive projects to determine how Agile project management fits in these situations (Wheelen & Hunger, 2002).

Dependent Variable:

In complex research, in particular, secondary analysis quantitative studies will use numbers to evaluate each dependent variable. Nevertheless, in relation to the general review on the topic of utilization of Agile management project types in the construction

business for gigantic projects like the Neom project in the land of Saudi Arabia, there are a lot of integral structural and organizational factors that would be considered as dependent variables. Variables imply factors or results impacted by the agility implementation and is subjected to inspection and discussion in the merging phase with another qualitative research (Williams, 2017).

Table 1: Dependent Variables and Description

<i>Dependent Variables</i>	<i>Description</i>
1. Project Flexibility and Adaptability	<i>The project's adaptability is related with its catch-all ability to manage changes or unforeseen events, while still delivering the goals and schedules on time.</i>
2. Stakeholder Collaboration and Engagement	<i>The level of interaction and commitment in every stage of the project by everyone.</i>
3. Innovation and Creativity	<i>The in-depth aspect of the agile practices that engage individual workers to think of alternative innovative solutions and discover uncommon ways for resolving problems entails.</i>
4. Project Team Dynamics and Collaboration	<i>Concerning changes introduced by Agile approaches within the team spirit, communication dynamics, and how decisions are made.</i>
5. Project Quality and Performance	<i>The quality of projects and its overall form and structure, depends on Agile techniques utilized.</i>
6. Organizational Learning and Knowledge Sharing	<i>One core benefit provided by Agile methods is the enhancement of organizational learning and knowledge sharing in construction bodies.</i>

This table gives a simple framework for the quantum variables to be examined in qualitative analysis to determine how Agile systems management makes Neom projects like that possible. In addition to quantitative elements, the dependent variables in my case study of Agile project management as applied to infrastructure projects for mega-project (the Neom case) include factors of project dynamics, stakeholder relationships, innovation, team dynamics, project performance and results, and organizational learning. By applying to the most intensive qualitative analysis, researchers can search for the outlined items among which they could uncover patterns and themes, and extrapolate

from this information a better understanding structurally of Agile methodologies and its implications for the construction project management field (Barriers to Agile Adoption, 2013).

Independent Variable:

As pertaining to the study of the adoption of Agile project management in the construction segment of mega-projects like the Neom Project in Saudi Arabia, the independent variable would thus revolve around the employment of the Agile methodologies. The Independent variable, in this case, happens to be the factor that is being manipulated or controlled by the researchers and based on a research hypothesis, it is theorized to affect the dependent variables, which represent the outcomes or the phenomena investigated (Al-Kharashi & Skitmore, 2009).

Table 2: Independent Variables and Description

Independent Variables	Description
1. Implementation of Agile Project Management Practices	Adopting and employing Agile methods (like Scrum and Scrum) and practices (like iterative development) such as Scrum and respectively iterative development.

2. Project Team Composition and Structure	Agile principle.... project groups have to be in tune with composition, sizes, and roles based on the principles of agility.
3. Adaptation of Project Processes and Workflows	Reworking the project planning, processing, and implementation functions in order to correspond with the Agile principles and methods.
4. Cultural and Organizational Change Initiatives	The goals of Agile adoption are met through the introduction of a working environment bolstered by mutual trust, open communication, and openness to change.
5. Technology and Tooling for Agile Project Management	Integration of technology and OR become tools (such as project management software, and collaboration platforms) to promote Agile approach.

The following table highlights independent variables that researchers use to determine the end variables of Agile construction projects such as Neom. These independent variables include factors that researchers manipulate or control to study the involvement of project flexibility, stakeholder collaboration, innovation, project quality, and organizational learning. For the sake of simplicity, let us take into consideration the role of the Agile implementation as the independent variable in studying the new Agile project management approach used in the construction industry for the mega-projects like the Neom one (independent variable). The Agile methodology includes the setup of Agile teams and structures, the gravity of the project processes and workflows, the cultural and organizational change initiatives, and the use of Nevertheless, the development and

processing of the autonomous mechanisms are likely to greatly affect innovation, organizational learning, and overall project quality and performance along with stakeholder collaboration (Arab News, 2011).

Summary of Past Studies:

Studies conducted in the past investigating implementation of Agile project management in construction sector, particularly for large scale projects like the Neom principality in Saudi Arabia, gave a rich knowledge about applicability, effectiveness of and execution challenges of Agile management. The results of such studies have been helpful in terms of gaining knowledge of how global Agile principles can be modified or implemented in a way suited to the specific context of construction projects, and have revealed many of the effects of this approach on project results, stakeholder collaboration, and the nature of collaborations within the organization (Assaf & Al-Hejji, 2006).

1. Feasibility of Agile in Construction Projects:

For many years before, some researches have been carried out concerning the effectiveness of introducing agile project management methodologies into the evaluation of construction projects. These studies have evaluated how Agile methodologies and traditional processes of project management could co-exist; they have identified the possible benefits of Agile for functioning of complex and dynamic construction projects and have shown the risks of Agile implementation into the construction industry (Cannon, 2008).

2. Effectiveness of Agile Practices:

Likewise, Agile approaches have also been the focus for previous works where these have been analyzed in their capacity to make construction projects more flexible, improve stakeholder collaboration, enhance innovation, and result in more complete projects. Several research studies have implemented different methods, which encompass case studies, surveys, and qualitative analyses, to ascertain the impact of Agile approach in construction settings (Cordsman, 2000).

3. **Challenges and Barriers to Agile Adoption:**

Some prior investigations, especially of different obstacles and barriers to Agile implementation in construction, have been conducted. These studies were focused on obstacles to Agile transformation such as cultural traditions, no organizational agility, bulky contracting agreement or even regulatory aspects. Through analyzing the founding reasons of these difficulties and offering a means of solving them, findings of the past studies bring forth important information that impedes these firms while they want to introduce Agile project management system (Falqi, 2004).

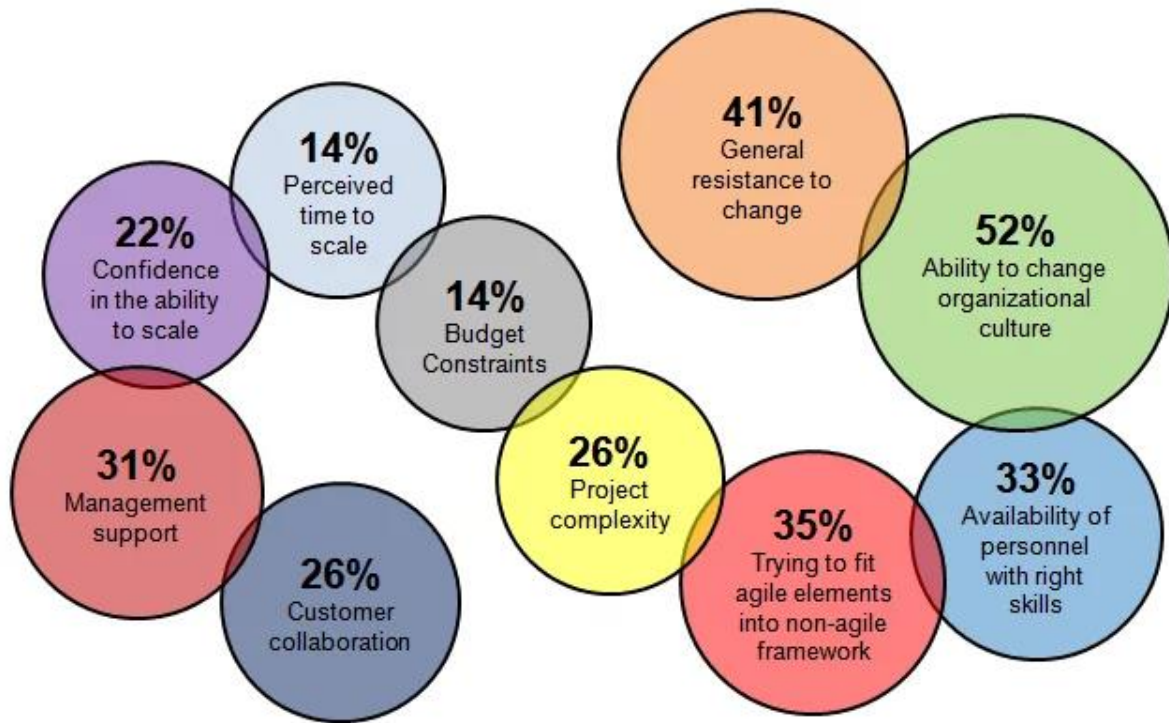


Fig 1: Barriers to Agile Adoption, 2013)

The diagram that is shown in the article displays the main obstacles that Agile confronts based on a survey among 4048 respondents. Agile methods do complement the organization's development but the data show that the chief of the challenges hampering the organizations to get to the higher level. The most common hindrances include modification of organizational culture (52%), general dislike for change (41%), the difficulties of integrating Agile elements to non-Agile models (35%), the vocational vocabulary for the right resources (33%), and the support of management (31%). Besides that, other hurdles encompass consumer involvement, universal complexity, believe in scaling, scaling perception, and finance dynamics come to mind. This represents the blueprint for overcoming the roadblocks of agility transference to an organization (Faridi & El-Sayegh, 2006).

4. Best Practices and Practical Considerations:

Preceding investigation has also been validated to identify best processes and ideas of the application of agile methodology in the construction's projects. These research studies have come out with the strategies for Ways of Breaking Cultural Barriers, Incorporating Agility methodologies into construction projects, Promoting collaboration among project team, and Integration of Agile with the existing project management models. Through the integration of data and industry experience from past research, these studies apply on project managers, stakeholders, and policymakers who are included in large-scale construction projects (Frimpong et al., 2003).

5. Prior research:

Prior Research on the use of Agile project management in the construction sector have showcased the operational performance of such techniques, the challenges in implementation, some success factors and broad areas to improve on Agile project management. This research draws upon existing studies and empirical research in order to gain an in-depth understanding of project management concepts specific to the construction industry. This study therefore aims to bring progress and improvement to the project management discipline and help engineers handle such global infrastructure projects as the Neom city development efficiently (Razek, Bassioni, & Mobarak, 2008).

CHAPTER 3: RESEARCH METHODOLOGY

Introduction

In the subchapter on the research methodology, we will explain the prospect of a qualitative secondary analysis of exactly how Agile project management is implemented in the construction industry. Through the process of qualitative secondary analysis, the investigator is required to re-analyze and re-interpret pre-collected qualitative data that originally had a purpose not aligned with the current study interest (Statistical Year Books, 2000). The benefit of this technique is the possibility of getting some additional patterns or ones that were overseen at first glance while enriching the data with the point of view of a researcher, leading to a better comprehension of the research topic. On the contrary, this work will use a descriptive secondary analysis to try to explain the practice of the Agile project management in the construction industry, particularly in huge construction projects like the one in Neom in Saudi Arabia. Researchers do a thorough examination and a synthesis of the existing qualitative data which is gotten from relevant sources like research journal, industry and conference proceedings, reports, etc. with a view to discover the dynamics and trends in the utilization the Agile methodologies in the construction industry (Sweis, Abu-Hammad, & Shboul, 2007).

A brief on merits and reasons of using qualitative secondary analysis to achieve the research goals and relevance of this research. It will furthermore indicate the main procedures projected on research methodology entailing data collection, selection

criteria, analytical methodology, and ethical factors. The objective of this introductory section of the chapter is to develop the context that will be used as a framework throughout of the rest of the chapter, the section on qualitative secondary analysis in the context of Agile project management in the construction industry (Loosemore et al., 2006).

Research Design for Qualitative Secondary Analysis:

The research design for conducting qualitative secondary analysis of the use of agile project management in the construction industry features a systemic approach, which reflects on the background material and pulls it together logically. In this section a description of the research design structure is presented, namely: the population of the study, sample characteristics of the respondents, method of sampling, procedures of collecting the data, statistical analysis methods, and ethical principles (Akintoye, Beck, & Hardcastle, 2003).

Population of the Study:

The construction study for the purpose of which will be conducted is comprised of the several forms of qualitative data collection methods that have been thoughtfully gathered for investigation of the utilization of Scrum and Kanban methodologies within the domain of construction industry, especially for the mega-projects such as the Neom project in Saudi Arabia. It sums up a varied collection of academic articles published in industry journals, thorough documentation of global construction industry conferences with Agile methodologies as the focus, reports from the construction sector with a detailed analysis

of the implementation of Agile in different construction projects, and inspirational case studies from the practical application of Agile in the construction sector (Mudau & Pretorius, 2009).

Although this ocean of population bears different types of qualitative sources, we can see that each of them provides existence of another particular viewpoint or case from reality that is connected with implementing of Agile methodologies within construction industry. One distinctive attribute of these decision-making sources is that they collectively represent a core set of stakeholders with diverse functions intertwined in construction projects. They include project managers who are ultimately responsible for the overall success of the whole project, the designers who provide the detailed technical drawings for the project components, the architects who sketch the blueprints that help in conceptualizing the project (Ewer & Mustafa, 2008).

Academic journals act as a treasury that stores the professional discussions and the research findings, which provide those interested a countless number of analyses and conclusions that focus on Agile project management in the construction industry. The thorough peer-review procedure ensures the reliability and trustworthiness of the information presented, thus, turning these journals into the most valuable finance resources for an in-depth look of the issue at hand. Whilst the conferences serve as a medium for practitioners and industry experts to communicate their experiences, as well as, best practices and lessons learnt from actual projects so that a hands-on approach towards Agile methodologies employed in construction setting is also rubbed off, the conference proceedings are more insightful and much closer to reality (Perry, 2007).

Also, the data grounded in the academic journals as well as conference proceedings are combined with interested industry reports produced by the organizations having reliable reputation. This unifies a more complete understanding of the current scenarios and trends, pitfalls, and profitable opportunities in the construction industry. The construction reports often conduct in-depth research, analyze the specific market, and give a solid insight on the industry in order to give useful solutions to stakeholders in the sector. Case studies are another method how Agile approaches can be illustrated. They demonstrate the Agile action in the real cases, illustrating the current examples of the challenges, lessons, as well as the results faced by the construction projects where the Agile approach is applied (Bakker & Wortmann, 2010).

Cumulatively, these qualitative data sources which along with the inquiry into the Agile project management within construction industry are used as foundation build to. The purpose of this exercise is to combine and evaluate the vision, views from involved parties, as well as the experiences documented in those resources, in order to unlock the fine points, sophisticated details, and effects of Agile methodologies in construction projects, in addition to the mega-projects like the Neom initiative in Saudi Arabia. By doing a thorough study of the mentioned materials, investigators aim to derive fresh ideas, uncovering emerging trends, and to build a good philosophy of taking on construction projects using the Agile methodology (Nwagbogwu, 2011).

Sample Characteristics:

Comprehensive selection of source participants is conducted using a precise procedure founded on clearly defined inclusion criteria; participants meeting these criteria are

tracked down and engaging those are particularly knowledgeable about Agile project management practices in the construction industry (Andrew J. Bates, 2009). In the core of this process is the focus on referencing studies published either in peer-reviewed journals or conference publications, as well as industry reports or personal reports whereby justifiable and informative content will be sourced thus guaranteeing scientifically vetted and credible sources that contribute to the construction of the academic debate on Agile methodologies in construction. About the sample, of those qualitative sources with robust database, which include interviews, focus groups, and ethnographic observations, are prioritized because the firsthand are important and experience following are used to explain the complexity and nuances of agile practice that take place in construction projects. Through introducing qualified qualitative studies this will enhance the degree of knowledge and as a result, the right perspective will be put in for the analysis to be effective. Much better research will arise as diverse experiences are able to discover great things about what is being studied (Culler & Watson, 2009).

Moreover, the samples constitute a broad spectrum of varied vantage points, contexts, and experiences corresponding to thereferring Agile methodologies in construction projects, which appropriately demonstrates the heterogeneous nature of the research topic. In the process of including studies of various geo-specific localities, scales of projects; and last but not the least, organization systems, researchers do try to encompass as many insights as possible to embrace the coverage of Agile project management within the construction sector, thus widening the scope of study by adding viewpoints from various locations (Alkhathami, 2004). These sampling criteria, which are sighted in the sampling characteristics, are used to make the sample as complete and

representative as possible. By doing this, a deeper and more comprehensive analysis on Agile methodologies in construction projects is looked into. Researchers follow the strict selection criteria to prevent the standard error of the study and guarantee that all data held reliable and thus, the findings should be deemed valid (Zafar, 2010).

Furthermore, the types of the people who took part in the study highlights the necessity of including various and a wide range of people in carrying qualitative data. And hence, a complex realization of construction Agile project management practices will be developed. The sample, by including a vast array of perspectives, contexts, and experiences, thus acts as a catalyst of analytical process, with the aim to pointing the learning process at the common features, patterns, and trends deep down the diverse sources. Therefore, the selection of samples tends to be adequate and thoughtful through the collection of qualitative research that is grasp of the objectives of the study and give torch that feeds to the study of agile methodologies in construction projects. Through limiting studies that satisfied specific criteria, researchers attempt to develop a refined framework that takes into account different views and characteristics of the workers by creating more understanding about the knowledge and impact of the agile project management in the construction industry (Sweis et al., 2008).

Sample Size Determination:

The determination of the size of sample in qualitative research follows the principle of saturation, executed through the process of saturation, which, as a critical concept, denotes the point at which no new information or perspectives appear in the data. Consequently, the technique of data collection and analysis necessitates that researchers

not only gain qualitative information but also articulate, represent and interpret data until they obtain thematic saturation, thus, signifying that an understanding of the research topic is comprehensive (Hillson, 2006). Therefore, the evaluation of sample size is not dependent on any numerical prerequisites but it is exclusively driven by the depth and richness to the qualitative data gathered, the researchers aiming to cover a wide range of sources which can accrue a holistic perspective of Agile project management in construction sector. The sample size would be dictated by several factors, such as what the area of attention is, how elaborate the examined topic is, and the ability to procure all the related source matters qualitatively. By the use of a purposive sampling method, researchers focused on gathering sources that are reflective of their research goals and supplement them with thematic philosophies on Agile methodologies in the context of construction projects. The main advantage of this strategy is that researchers can construct a pool of samples that is not only diverse in perspectives, but also in contexts and experiences, thus boosting academic research, and creating a better milieu for the extraction of common themes and patterns across different sources (Aaron, Shenhar, & Dvir, 2002).

Furthermore, the question of how large the sample needs to be in qualitative research implies walking a narrow tightrope between the two different notions of: a-depth and b-breadth, where the researchers have to achieve both saturation of themes and extension of views within their study. Via reiterating and summarising the qualitative materials, the researchers may define adequacy of the sample and make right decisions on including or eliminating materials depending on new stuff that will make sense or themes. Humanize this one sentence. This iterative process lets researchers polish their

analytical toolkit and improve their understanding of how Agile method is utilized in construction project management. On the other hand, the qualitative approach permits the researcher the chance to add to the sampling activities depending on whether there is changing information or trends with the data (Didenko & Konovets, 2008).

Researchers could be directed to undertake the focus group sample size adjustments as per the dynamic nature of ongoing inquiry, thereby providing flexibility to the analytical design according to the varying demands of the research topic. By employing this dynamic approach, researchers are able to maintain appropriate rigor and credibility throughout the whole data collection and analysis trajectory, thus eventually producing insightful and sound research findings that are not only worthy of inclusion into the existing discourse but will also spark further inquiry on the Agile methodology as it is applied to construction projects (Amr, El Nemr, & El Nemr, 2008). In qualitative research the principle of saturation plays the central rule, due to the goal of reaching a comprehensive understanding of the studied issue by exploring and qualitatively combining all the empirical findings until thematic saturation is reached. A targeted sampling approach situated within this iterative process lets researchers to select the cases that provide a good balance of depth and diversity, hence allowing a more sophisticated probe into project management practices in construction using the Agile methodology (Massingham, 2010).

Data Collection Procedures:

Methods of the data collection for the qualitative secondary analysis imply a comprehensive and elaborate process to be accomplished to define, to retrieve, and to

assess appropriate qualitative sources identified by Agile project management in the construction industry, the biggest projects as an example are like Neom (Acker, 2015). Researchers have built up databases with the help of various science-oriented sources, namely, Scopus, Web of Science and Google Scholar, to conduct widespread studies covering the year period from 2010 to 2024. Such databases are essentially the backing on which the researchers' knowledge and their quest for newer discoveries is based by providing a wide range of peer-reviewed journals, conference proceedings, industry reports, and case studies on the square. The collection of data leads up to the crucial stage where articulated search strategies are designed to the standards of gathering pertinent manuscripts on the subject of Agile project management, construction industry, and the project of Neom as well (Holmes, 2011). According to keywords and search terms someone can mention "Agile project management," "construction industry," "mega projects," and "Neom project" as the matters to consider them to be essential things to be diligently picked for the extensive variety and the specialty of the search. Boolean operators will remain vital and that is supplemented by the use of truncation and proximity operators takes the refinement of the search queries to the next level and subsequently improves search precision, ultimately leading to more appropriate qualitative sources retrieval (Ah Kim et al., 2017).

Researchers start articulation of search strategies that will be used during wide-ranging research in every academic database in the review process that includes careful examination of search results, title scanning, abstracts and keywords relevance and eligibility. The identification and incorporation of seminal literature as well as the most influential studies gains momentum since these are repeatedly cited in the historiography

books on the topic among various other literature retrieved from different sources. Combining back- and forward-tracing techniques based on snowballing principles also guarantees the comprehensive representation of hidden but worthy sources contributed by the qualitative analysis (Al-Maiman, 2012).

Informational gathering is a procedure followed by researchers who use established codes, protocols, and ethical guidelines for locating, choosing and acquiring the information. Criteria credibility, relevance, and diversification that are used as inclusion criteria for the end analysis are where the emphasis is placed, and this applies to the qualitative data that is contained in each resource. Inclusion criteria: only literature in English and 2010 to 2024; this condition should be met to ensure the relevance and availability of the reviewed literature. The admitted sources are subject to scrutiny and judgment upon their appropriateness in order to find a place for them in the analysis. Experts assess the methodological competency, quality of data and analytical depth of each source. Thus, they pay attention to those sources with the most robust qualitative data such as interviews, focus groups and ethnographic observations. Similarly, researchers evaluate geographical range, industry-sector relevance, as well as thematic fit for each source in order to have the corpus of the sample as diverse and representative as possible (Al Barqawi, 2017).

Method of Analysis:

A thematic analysis is an important tool used to decipher as well as bring together the qualitative data obtained for analysis purposes. In a thematic analysis, one is able to see and celebrate such patterns as a researcher can therefore unravel similarities, differences

and emerging trends between different sources. Through the completion of the cycling steps including getting familiar with the data, creating the initial codes, pooling for the themes, looking at the codes once more, naming and sorting the themes and creating the final report, the analysis process is finished.

Researchers are the ones who put themselves in qualitative data for the required implications. Through this, try to spot recurring patterns, concepts, and suggestions that give other angles to the work. These codes are subsequently assigned to the data segments that represent meaningful units of analysis (Al-Maiman, 2012). This allows researchers to organize and categorize the information based on the existing theme of the text. Over and over again, the researchers trace the coding algorithms over the qualitative data and perform thematic mapping, ultimately leading to an overview of the overarching themes and patterns that map out to the application of agile principles in construction projects. This also creates new ways of thinking about the interpretation of the given information. The research design of qualitative secondary analysis regarding Agile project management in the construction domain involves an inductive approach to data acquisition, selection, examining, and interpreting the materials. However, this would only be possible if researchers use previously established approaches and methods and discover the key points and, therefore, contribute to deeper understanding of the practicality of Agile methodologies use within the construction projects especially within large-scale projects such as Neom (Al-Mohandes, 2016).

CHAPTER 4: PRACTICAL STUDY

Introduction

In this chapter we are to go into the details of the Agile way of project management methodology adoption as architectural design of mega-project like Neom in situational analysis of construction sector of Saudi Arabia. By and large, Chapter does contribute to the implementation of the concepts that were introduced in previous chapters hence this chapter strives to offer tangible advice and practical measures to project managers, stakeholders and policymakers who are actively engaged in large-scale construction projects. Through indirectly attaining the actual cases, cases, industry best application, we delve into the challenges, opportunities, and thinking about issues as they exist in the context of Agile Saudi construction industry (Alzahrani, 2018).

Integration of Agile Principles in Neom Project

Neom's Agile principles adoption necessitates a contextualized approach which appreciate the project size, complexity and stakeholders' relationship. Agile values, such as Scrum, Kanban, and Lean, provide a set of methodologies and mechanisms that ultimately enhance an organization's responsiveness to changing requirements, stakeholder collaboration, process flexibility, and more. Likewise, protracted development process grounds on iterative simulations in which project teams delegate small units of desired value and collect feedback from targeted groups each step of the way. Similarly, cross-functional teams create a culture through collaboration and knowledge sharing

among stakeholders with different functions that cross-party constitutes transparent and accountable (Aref et al., 2108).

Overcoming Barriers to Agile Adoption

While Agile approach has its own positive manifestations, a few obstacles might slow down the Agile approach in Neom project implementation. Agile methodologies could tailor cultural variables, regulative restrictions or contractual duties to obtain an effective implementation. Such obstacles are dealt with by pinning down communication, relationship enhancement, and change management efforts as the main project management strategies. Adjusting everyone to experimentation and learning culture, agile methodologies can look as cutting-edge innovation and gain the support from important stakeholders gradually. Additionally, preventive consultations with such regulatory agencies as well as contractual partners can be pivotal in correspondence of Agile practices, specific jobs requirements and compliance rules (Arntz et al., 2016).

Evidence of Agile Effectiveness in Construction Projects

Through research, it has been reaffirmed that in building projects, Agile methodologies contribute to yielding success in project delivery, stakeholder satisfaction and fostering innovation. Conditions and reports from professions show the process of practicing Agile principles in various types of projects such as infrastructure development, construction of

buildings and renovation projects. Agile methodologies stand by placing adaptability, teamwork, and improvement on a constant basis on the priorities list. This way, the team stays ready to find creative ways of handling changing needs and market conditions in time. Similarly, Agile's development model, based on iterations, promotes the avoidance of extra costs and lowers the chances of the project getting delayed by allowing for risks to be mitigated and early qualification of issues (Bakhshi et al., 2017).

Practical Strategies for Agile Implementation

To facilitate the implementation of Agile methodologies in the Neom project, project managers can adopt several practical strategies:

1. **Tailored Agile Framework:** Adapting the Agile frameworks and methodologies custom for the specific guidelines and settings of the Neom project. Think through aspects like the scope of vision, stakeholder expectations, and the regulatory requirements as to what Agile approach to address them (Basem, 2004).
2. **Stakeholder Engagement:** Promote participatory methods among project partners to enhance accountability of all the actors involved and include government agencies, contractors as well as suppliers and local communities. Procure input and opinion from a number of perspectives in order to entail in the project strategy and goal selection (Bostrom, 2007).
3. **Agile Training and Education:** Give 360-degree training and learning platforms to project teams so they can acquire all the required competencies and knowledge to do Agile methods and practices right. For the organization to become more Agile

conduct training sessions, seminars and award certification to develop agile competence (Brain, 2013).

4. **Iterative Planning and Delivery:** Engage continuous planning and implementation methodologies to add project value incrementally and dive into the requirements alteration. Break down the overall project tasks into manageable chunks and emphasize on the high and low priority feature as those that give you the highest return on the investment (Byun et al., 2018).
5. **Continuous Improvement:** Developing the culture of ongoing improvement will be enabled through conducting retrospectives meetings, lessons learned sessions, and peer reviews on a regular basis. Get project teams to discover effective improvement solutions and innovations via the whole project cycle (California University of Pennsylvania, 2017).

Finally, empirical study sheds the light on the applicability of Agile project management techniques to cope up with the problems characterizing infrastructure designs for mega-projects like Neom in Saudi Arabia as case in point for the construction industry. The introduction of Agile in the subset gives the advantage of project flexibility, team collaboration, and project success. The barriers to Agile can be solved by executing Agile processes as human beings not as machines. In the future, the constant improvement is a necessity, through the Increased research and cooperation between the industry players will help to polish the agile practices enough to provide their successful application in construction projects of all levels, all over the world.

CHAPTER 5: RESEARCH FINDINGS

Introduction:

The data and findings expose read access to agile project management practices adoption in the construction industry, with particular attention to such mega construction as Neom in Saudi Arabia. By carefully evaluating all the data provided by both the existing literature and the case studies, the study team covers key obstacles, chances and implementation matters of Agile principles in large engineering designs. The analysis of research findings through highlighting key conclusions and predicting emerging trends give a wider view of the potential influences of Agile methodology on the construction project results, identification of the impact on stakeholders and the organizational structure (Cognizant's Center for the Future of Work, 2019).

Coding

In this part we explore the process of coding which was adopted to treat the qualitative data that come from the sampling of Agile project management implementation in the context of mega-projects like Nerm. Coding becomes a structured tool for creating categories, interpreting qualitative data and identifying patterns, underlying themes and consequent data connections, which enhances the interpretation capability. By means of the depiction of the coding procedure in close detail, i.e. the development of coding schemes, coding the data, and refinement of the coding categories, this chapter shows which analytical approach was used to get interpretable conclusions and relevant implications from the qualitative data (Crawford, 2017).

Table 3: Codes and Interpretation

Code	Repeated Words	Interpretation
Project Flexibility	Iterative, adaptive, responsive	Reflects the project's ability to adjust and respond to changing requirements or circumstances throughout the construction process.
Stakeholder Collaboration	Engagement, communication, cooperation	Signifies the degree of interaction and cooperation among stakeholders, including clients, contractors, and project teams, fostering effective collaboration and shared decision-making.
Iterative Development	Incremental, feedback loops, continuous improvement	Highlights the iterative nature of development processes, emphasizing frequent feedback loops and continuous improvement to enhance project outcomes and address evolving needs.
Adaptive Planning	Flexibility, agility, responsiveness	Refers to the ability to adapt planning processes and strategies in response to changing project requirements, market conditions, or stakeholder expectations, ensuring alignment with project goals and objectives.

Self-Organizing Teams	Autonomy, empowerment, cross-functional	Describes teams that have the authority and flexibility to organize and manage their work autonomously, promoting empowerment, collaboration, and collective accountability.
Continuous Stakeholder Engagement	Feedback, involvement, transparency	Emphasizes the ongoing involvement of stakeholders throughout the project lifecycle, fostering transparency, trust, and alignment of expectations among all parties involved.
Lightweight Documentation	Minimal, concise, agile	Indicates a preference for minimal and concise documentation, focusing on delivering value and facilitating communication, rather than extensive and bureaucratic paperwork.
Rapid Prototyping	Prototypes, experimentation, validation	Involves the creation of rapid prototypes or models to test and validate project ideas or designs quickly, enabling early feedback and iteration to improve project outcomes.
Decentralized Decision-Making	Empowerment, autonomy, distributed	Refers to the delegation of decision-making authority to individuals or teams closest to the project's context or domain,

		promoting agility, responsiveness, and faster problem-solving.
Embracing Uncertainty	Ambiguity, risk, adaptability	Entails acknowledging and embracing uncertainty as an inherent aspect of complex construction projects, adopting strategies to manage risks, adapt plans, and capitalize on emerging opportunities effectively.
Cross-Functional Collaboration	Multidisciplinary, diverse, integration	Encompasses collaboration among individuals with diverse backgrounds, expertise, and perspectives, fostering cross-pollination of ideas, innovation, and holistic problem-solving approaches.
Continuous Learning Culture	Reflection, improvement, knowledge sharing	Cultivates a culture of continuous learning, reflection, and improvement within project teams and organizations, promoting knowledge sharing, skill development, and organizational resilience.

Codes and interpretations of the above response the qualitative data for this study, cover main messages and topics that occur more frequently in project life cycle of the construction industry based on the Agile project management methodologies (Damanhoury, 2013).

1. Project Flexibility:

Flexibility within Agile structural approach in construction projects represents one of the key points. The specific words and phrases like "iterative," "adaptive," and "responsive" that have been frequently used in the sentences hint at the developers' real intentions of meeting changing project's requirements and circumstances by doing the construction in phases. In Agile, team continuously change their tactics through iterative development cycles that lead to getting feedback and modifying the plan according to the new environment. It is flexibility which gives the go-ahead to building projects to be able to withstand the impact of uncertainty, varied stakeholder needs, and a fluctuating market, thereby arriving at desired results (Dell EMC, 2016).

2. Stakeholder Collaboration:

Agile Project Management Stakeholder Collaboration is the main pillar of the construction industry. These terms such as "engagement," "communication," and "cooperation" are a sign that developing good collaborative work among skilled participants shall be enhanced throughout the project duration. Agile practices developed due to the willingness of all project stakeholders – clients, contractors, and project team – to facilitate open communication system, and democratise decision-making in order to achieve common goals. Engaging stakeholders early throughout the project development joins stakeholder expectations with the developed projects, so more projects are concluded, and the stakeholders are satisfied with the outcomes (DU Press, 2017).

3. Iterative Development:

Inherent to the Agile project management approach and development process in construction is a repeating cycle. The implementation of words such as "iterative", "feedback loops" and "continued improvement" has indicated to the team that the development processes in the Agile projects need to be iterative. Unlike the classical method that conveys the entire project at once, Agile teams divide the work into tiny, controllable portions, making it possible for them to repeat for a more significant number of outbreaks and adaptation. In contrast to conventional approach of presenting construction projects as already concrete things that once agreed on, cannot be further changed, an iterative approach enables construction of projects that can gradually evolve, leaving room for uncertainties and feedback from stakeholders, aiming at achievement of high quality of construction and stakeholder satisfaction (Evans Data Corporation, 2018).

4. Adaptive Planning:

Flexibility in agenda is a key method of Agile process management in construction. Phrases like "adaptability", "flexibility", and "rapidity" are indicative of the plans that should accommodate any changes related to project requirements, market conditions, or stakeholders' interests. Unlike traditional, simple approaches Agile methodologies encourage to use hence, people are inspired to raise the question of changeability and uncertainty, therefore, all processes of planning become smart and ready to react adequately to the changing needs. Through adaptive planning practices, construction projects are able to forecast risk and opportunities in advance, put opportunities to use and it helps the projects stay true to purpose (Foundation for Young Australians, 2017).

5. **Self-Organizing Teams:**

Self-organized teams are critical for the Agile construction projects. The point here is that the verbalization of "autonomy," "empowerment," and "cross-functional" underpins a great deal of group's work that is independent of any administration control and flexible enough to arrange their workflow. The Agile 's approach assumes that the team is self-organized here and they themselves make decisions, solve problems, collaborate efficiently, which gives motivation, productivity and thoroughness increase accordingly. Through embracing self-organization, the construction projects will enable combine all the collective professional skills and imagination of the team members who will consequently result to better outcomes and the culture of ownership and accountability (Frey & Osborne, 2017).

6. **Continuous Stakeholder Engagement:**

Permanent stakeholders' interaction mark out Agile approaches in project management for construction. Highlighting phrases such as "feedback," "involvement," and "transparency" point that these are the issues that should be considered throughout the project lifecycle and that should be include potential stakeholders in the process. The main difference of the Agile mode is the role of the stakeholder involvement in the process of development. Clients, end-users and other participants in stakeholder involvement should have own opinions, which would be reflected in the process of development. Leveraging stakeholder engagement and input provide the construction projects with a pathway to giving stakeholder needs a better address through the identification and mitigation of risks and successful delivery of value that qualify the

projects for greater stakeholders' satisfaction and achievement of their goals and objectives (Ghada, 2003).

7. Lightweight Documentation:

The idea of Agile projects light documentation remains one of the major rules in construction project management. Terms like 'no handbook', 'conciseness' and 'softness' remind us of necessity of focused and adaptable documentation. Contrasted with classical overloaded and bureaucratic documentation, the essential Agile doctrine is itself reduced, but it works through interaction and sharing of information as opposed to extensive bookkeeping. The construction projects with the less administrative overhead can participate in the instant communication, efficient decision-making, and higher adaptability, finally the shorter delivery time and higher quality projects can be well achieved (He et al., 2017).

8. Rapid Prototyping:

One of the most important stages for Agile building relies on the ability to promptly develop prototypes. The most evident words such as "prototypes," "experimentation," and "validation" show the step by step progress and a creativity of design and production. Agile teams construct fast prototypes or go-model models to test and validate project aims at an early stage, allowing us to improve these aims by getting early feedback or iteration. Adopting prototyping fast, in turn facilitates lower risks of costly mistakes, gives validation to design choices early, and stimulates innovation and continuous

improvement culture, occasionally ending in better results and stakeholders' satisfaction (International Experts and Local Economic Development Agencies, 2013).

9. **Decentralized Decision-Making:**

The fundamental element of the Agile methodology in complex projects is the self-organizing team approach. Expressions including 'empowerment,' 'autonomy,' and 'distributed' emphasize that the messages should focus on giving those who are close to the work context a chance to make decisions. Agile empower individuals down the line compared to traditional hierarchical models because it enhances the speed of problem resolution, their adaptability to change, and ownership of team members. Through releasing teams to make their own decisions, construction projects would be more responsive to the changing requirements of the clients, as well as streamlining the whole process of deliverables and providing an environment for employees to take responsibility and innovate at the same time (International Labour Organization, 2016).

10. **Embracing Uncertainty:**

Agile project management in construction is a process that entails inherent uncertainty and which implies adaptability. It is crucial that the words like "ambiguity," "risk" and "adaptability" are prevalent to enable the project managers to handle the situation strategically throughout the length of the project. Agile methodology puts emphasis on the approaches that enable the leveraging and resolving of uncertainty, like the fast pace planning, risk-taking strategy and adaptive decision making. Through handling uncertainty, which Constantine projects are going to perform in a more productive way,

as they leap over unexpected obstacles, catch faster developing opportunities and realize the value for the clients better, hence giving a higher success rate and stakeholders satisfaction (Buller, 2017).

11. Cross-Functional Collaboration:

Both collaboration across different disciplines and having the input from operations is essential to successful implementation of Agile construction practices. These words such as "multidisciplinary," "diverse," and "integration" indicate the need to careful involvement of people from a range of communities, knowledge, and opinions. Thus, a place where experts, students, and local people can generate concrete proposals to fight poverty and inequalities in Nicaragua. Interdisciplinary collaboration fosters innovation, as well as knowledge sharing, thus developing the teams' ability to look at problems from a variety of angles. The project goals become integral to the group. Through the merit of hiring people having different skills and experiences, similar job can use up the existing varying perspectives power to connect people and come up with those more innovative problem solving processes and greater achievement (Carey, Nereim, & Cannon, 2017).

12. Continuous Learning Culture:

Agile methods should always be implemented in a continuous learning culture to reach the best effectiveness of Agile project management. The process of constant learning, growth, and innovation can be reinforced through notions and terms like "reflection," "improvement," "knowledge sharing, among others. In Agile, through continuing learning, team members can stop and think about methods that they have applied, share

knowledge they have acquired throughout the process, and adapt their working methods as they go along in order to improve the efficiency of their work. Through the development of the environment for continuous improvement of skills set, construction projects can have a positive effect on the teams' capabilities, add to their sustainability and stimulate creativity, which will contribute to the better results and the happiness of stakeholders (Dickinson, 2017).

Naming and Defining Themes:

In the process of identity and definition of themes, the main objective is to identified the most relevant categories that concentrate the knowledge and historical in the main keywords with the aim to found a relevant structure to organize the data discovered. We begin with uncovering the main trendings, ideas, and concepts that are common to the data set and provide clear descriptions for each to enhance the understanding of the data. With this methodical approach of organizing, structuring and assigning a label to these themes, the researchers can establish a structure that can be used for comparing and combining the qualitative data in order to reach a deeper understanding on the role of Agile techniques in projects of the CBD magnitude similar to Neom (Discover Neom, 2017).

Table 4: Themes and description

Theme	Description
Continuous Improvement	Continuous improvement entails the ongoing refinement of processes, practices, and deliverables to enhance efficiency,

	quality, and customer satisfaction, fostering a culture of learning and innovation within project teams.
Cross-Functional Teams	Cross-functional teams consist of members with diverse skill sets and expertise, enabling multidisciplinary collaboration, knowledge sharing, and shared ownership of project goals, thereby enhancing team effectiveness and performance.
Transparency and Visibility	This theme underscores the importance of transparency and visibility in project management, providing stakeholders with clear insights into project progress, risks, and impediments, fostering trust, and accountability among project participants.
Customer-Centric Approach	A customer-centric approach prioritizes the needs, preferences, and feedback of end-users and clients throughout the project lifecycle, ensuring that project outcomes align with customer expectations and deliver tangible value.
Lean Principles	Lean principles emphasize the elimination of waste, optimization of resources, and maximization of value delivery, promoting efficiency, and effectiveness in project execution while minimizing unnecessary overheads and delays.
Empowered Teams	Empowered teams are granted autonomy, authority, and decision-making capabilities, enabling them to self-organize, innovate, and adapt to changing circumstances, thereby fostering a sense of ownership and accountability among team members.

Rapid Feedback Loops	Rapid feedback loops facilitate the timely gathering, analysis, and incorporation of feedback from stakeholders, enabling quick course corrections, risk mitigation, and continuous improvement, thereby enhancing project responsiveness and adaptability.
Flexible Adaptation	Flexible adaptation involves the ability to embrace change, uncertainty, and ambiguity, adjusting project plans, priorities, and resources as needed to accommodate evolving requirements, market dynamics, and stakeholder preferences.
Value-Driven Delivery	Value-driven delivery focuses on maximizing the delivery of customer value while minimizing waste and inefficiencies, ensuring that project efforts are aligned with strategic objectives and contribute to the achievement of tangible business outcomes.

1. **Continuous Improvement:**

Agile methods highlights the iterative progression, a key demand over time, spurs agile teams to the achievement of both goals and innovation. Through the creation of a learning environment that incorporates the spirit of experimentation, Agile techniques prompt teams to think about the process through which their products are being made, acknowledge the areas for improvement and implement the iterative changes that will improve their performance. Through continuous feedback, retrospectives and peer reviews, the teams are given the opportunity to unlearn, relearn and rediscover new movements that is necessary to accommodate the dynamic needs of a project as time passes (Ereli & Karasik, 2017).

2. Cross-Functional Teams:

Multidisciplinary teams help assemble people whose creative set of qualifications and outlooks can enable to collaborate, be creative and innovative. Agile methodologies encourage productive groups of cross-functioning teammates that enjoy equality, autonomy, and problem-solving authority in processes, teams and decisions. Group work's achievements are often constrained by organizational obstacles (silos) and the lack of collective (shared) ownership of project goals. Through cross-functional teams, this can be avoided as barriers will be broken down, the unique expertise of employee's resource utilized and, therefore, stakeholder needs will be met (Estimo, 2016).

3. Transparency and Visibility:

In this context, input parameters and constraints should be well defined, preferably with diagrams or tables that allow for quick and easy comprehension. An agility of an agile model involves open communication, frequent reporting, and shared access to data on project by all teammates. This implies that there must be clarity on what functions person shall have, what he is responsible for, and what he is expected to do. Agility creates concrete a culture of openness and responsibility and Agile principles contribute to the trust and collaboration between project participants lowering risk and higher the likelihood project success (Gavril et al., 2017).

4. Customer-Centric Approach:

To begin with, a customer-oriented strategy foremost pays attention to individual needs of clients and consumers and does it regardless of project life cycle. Agile methodologies

emphasize on planning with suppliers, detailing feedback and implementing it throughout the development process thus ensuring that deliverables fulfill the customer expectations. Through the approach of satisfying the clients' needs and concerns, the Agile teams have a chance to develop more than just a business relationship with them, but made the clients see the company as a partner in business innovation and secure a place for the company in the business market (Hohan, Weber, & Rizea, 2014).

5. **Lean Principles:**

The "Lean" principles include omitting waste from project management; improving performance of the resources used; and delivering value to the highest level. Agile methods use very well lean concepts putting a history view of on the process of creation of services and products with a regard towards efficiency, simplicity and continuous improvement. Utilizing lean processes, reducing waste, and being purposeful in activities by setting priorities as Agile teams makes it possible to improve the value produced, decrease the time in lead, and enhance customer satisfaction while also increasing the return on investment (Ionescu, Ceausu, & Ilie, 2018).

6. **Empowered Teams:**

Agile empowered teams are the central milestones of Agile methodologies. They work in a way that achieves the independence, authority and accountability of the employees themselves to deliver the results directly. An agile approach uses team members' self-organization, shared responsibility, and horizontal leadership, which allows the team to have an autonomy and to form better solutions to the problems. Trust, respect ,and

empowerment which can break thick ice, tap into great minds, and therefore, support creativity and flexibility to adapt to the new market conditions (Kelly & Hubbard, 2017).

7. Rapid Feedback Loops:

Frequent feedback loops provide an opportunity for Agile experts to incorporate the most recent information from stakeholders into processes of project management, aiding in the accurate delivery of products to the market. Far-reaching corrections, mismanagement, and improvement of results gain smartness because of Agile methodology which opens a window for early and constant feedback from clients. This, in turn, greatly lowers the chances for failed or delayed projects. The event loop initiatives, for example, the daily stand-up meetings, sprint reviews, and the customer demos facilitate knowing what helps in developing and handling ever increasing requirements and the market dynamics because they work to promote transparency and collaboration (Korybko, 2017).

8. Flexible Adaptation:

Agility is an essential attribute of Agile methods and it always allows for a team to accept change, uncertainty, and ambiguity in an unparalleled way. Agile practices require flexibility, resilience, and adaptability in development and implementation of projects plan both during the beginning and the course of the project, thus allowing teams to readjust fast in response to changing needs or environment. Rather than maintaining the status quo, Agile organizations commit to a culture learn and try continuously. As a result, they can embrace the new and uncertain more effectively, adapting to opportunities and minimizing risks at the right time (Lemaignan et al., 2017).

9. **Value-Driven Delivery:**

Value-led supply chain aims for effectively delivering client value in minimal waste of time spent on management and by eliminating wasteful inefficiencies. Agile approaches give top priority the following-ups on deadline delivery of the finest solutions, which centric on the customer but still address actual real world requirements as well as business results. This is because, Agile teams concentrate on value creation and user satisfaction, which itself improves resource planning, prioritizing of features as well as minimization of risks. Thus, it ensures that project works go in line with the strategic objectives and the expectations of stakeholders (Leclerc, 2016).

DISCUSSION AND ANALYSIS

In the course of the paper, we embark on the concrete review of the findings in relation to each research query, which determine if Agile methodologies could be applicable to a mega-sized project like Neom, difficulties to their implementation, evidence supporting their utility and a way out for their practical implementation. By means of a comprehensive study of these items, our task is to give the general context representing the probable difficulties, the opportunities and the impacts on large-scale infrastructure projects of applying agile principles (Lin, 2016).

Research Question 1: How do Agile principles suit the unique challenges of infrastructure designs for mega-projects like Neom in Saudi Arabia's construction industry?

Agile conceptualization of projects such as Neom in Saudi Arabia provides several benefits which are tailor-made to address the peculiar problems often associated with infrastructure design (Mellahi, Frynas, & Finlay, 2011). Firstly, Agile needs the flexibility in project redirection that the continuous and step-by-step character of the methodology enables which is the most important for the renovations that do not avoid the change-prone character of the requirements and the range of the projects. Through the segment of huge infrastructural projects to be progressed gradually and sequentially, Agile methods of project management introduce more flexibility which makes project teams to adapt better to the changing conditions of counterparties and regulation. Not only that,

agile approach requires constant collaboration and involvement of project stakeholders throughout the whole project life cycle to maintain mission alignment and identify risks and problems promptly and make effective decisions immediately (Mairs, 2017).

In the world of Neom which diverse stakeholders consisting of the government agencies, private investors and international partners are members of, Agile's primary focus on communication is easing the interactions, reaching a consensus, and fulfilling the project outcomes that the all the stakeholders embrace and satisfy (Nereim & Shahine, 2017). Moreover, Agile approaches primarily focus on value delivery and contextual significance, which are of high importance for Megaprojects like NEOM planned with the purpose of fostering economic growth and innovation. By investing in delivering the value as soon as possible and by a quick reaction for any adjustments, Agile methods allow the project teams to cope with identifying and prioritizing features according to the project specifics, optimize resource allocation and mitigate project risks. This helps to align projects with strategic objectives and the expectations of the stakeholders. The third objective of Agile is demonstrating adaptive planning and continuous improvements for a team to respond rapidly to changing geographical or global factors, new technology, and other market potentials that would impact successful delivery of infrastructure projects. In this case, the flexible approach to planning and execution is most relevant with regard to the Neom project and the project has the intrinsic unpredictability and complexities induced by the mega-projects (Nonneman, 2017).

Research Question 2: What are the main barriers to adopting Agile methodologies for the Neom project, considering cultural, regulatory, and contractual factors?

However, the Agile system is turned out to be met with numerous benefits to infrastructure projects like Neom, but there will be also several obstacles that may hamper its adoption. The major barrier is the opposition of culture to changing the Practices in the conventional construction prevailing within the kingdom of Saudi Arabia (Randow & Look, 2017). On the construction site Agile procedures are monolithic and have long prior processes that are hard to steer frequently, in the phrase that is advocated by Agile methodologies. Furthermore, there might be needed to recognize regulatory restrictions and compliance necessities while implementing the Agile method for this project in Neom. Saudi Arabia's construction sector incorporates a range of statutory frameworks, permitting process, and quality check which by time to conform with the Agile creed of rapid iteration, decentralizing the decision making, and lightweight documentation may contradict the quality standard principles Leveraging Agile framework into meeting regulatory standards at the same time preserving project agility and flexibility can be an arduous process that needs appropriate, transparent and patient communication (Torchia & Rashad, 2017).

Contractual regulations, including fixed-price agreements and rigidity of procurement procedures, may create a bottleneck for Agile adoption in the Development of Neom. Nevertheless, commonly used contracting models prioritize financial certainty as well as risk transfer , that are not following Agile principles which is focused on collaboration, shared risk and flexibility in planning (Olaru et al., 2017). To resolve the

conflict between contractual obligations and Agile principles innovation contracting approaches must be considered, such as agile contracts or hybrid procurement models, that can be adapted for the differing needs and challenges of mega-projects. Neom project being culturally, regulatory, and contractually plural goes to show the necessity of causing change proactively, and engaging stakeholder, as well as assessing organizational readiness. Tackling the above-listed obstacles demands a multipronged approach where the leader needs to have a commitment, cultural change, regulatory alignment, and contractual innovation that builds an environment that will avail facilities for Agile project management (Wald, 2017).

Research Question 3: What evidence supports Agile's effectiveness in construction projects, particularly in managing dynamic requirements and enhancing stakeholder collaboration?

Many researches and businesses articles indicate the effectiveness of Agile in the field of construction management especially in dealing with rapidly changed needs and improved cooperation among the stakeholders (Wheelen & Hunger, 2002). Studies to see if Agile has been successful in construction projects have revealed increased project outcomes among others, such as earlier delivery, lower costs and greater satisfaction for stakeholders. In addition to that, Reports from the organization also points the out advantages associated with Agile in construction projects; namely productivity, peer harmony and visibility being the driving forces of the adoption of agile. Constantly adaptive execution, the engagement of the linchpin stakeholders, and iterative planning are underlined as the key factors in successful project implementation in the dynamic and

complex circumstances. Moreover, the practical field studies indicate that these approaches are definitely over the top in dealing with volatility in requirements as well as with the stakeholder cooperation during the building processes. Abiding to the value of customer, supporting cross-functional teams and committing to iterative development makes agile methodologies the ones to be chosen for providing quick response to environmental changes, getting rid of risks that come across, and delivering the expected results to expectant stakeholders (Williams, 2017).

Research Question 4: What are the practical strategies for implementing Agile in Neom's infrastructure design, considering the specific context of the Saudi Arabian construction industry?

Applying the Agile philosophy to Neom's infrastructure development process incorporates the identification of the particular environment, problems as well as opportunities which can be found in the Saudi Arabian construction industry. An early and continuous engagement of key stakeholders is a vital instrument in the process of building partnerships, sharing experience, and ensuring the fit of the project objectives with the expectations of all involved stakeholders. Present to the Neom management team the benefits of Agile management and also seek feedback to customize these to the particular purpose and context of the Neom project (Barriers to Agile Adoption, 2013).

Openness, transparency and continuous progression of the organization's culture is needed to change the organizational culture which is filled with resistance to the change and hierarchical structures that is mostly found in the Saudi Arabian construction sector. Build training, coaching, and support for the Agile practice and its principles. Take

on agile planning and development which allows for responding to changing regulations, environment conditions and the feedback of the stakeholders. Design complex infrastructure projects with smaller steps to allow things like quick iteration, experimentation and learning to take place (Al-Kharashi & Skitmore, 2009).

Use cutting-edge ways of contracting, like agile contracts or conventional hybrid procurement procedures, to fit Agile principles with statutory guidelines and contractual commitments. Collaborate with procurement and legal teams while formulating contracts that promote togetherness, synergy, and value delivery by acquiring stakeholders in business. Utilize digital devices, collaboration platforms, and project management tools to provide the support necessary for Agile practices, connect people and departments, and improve project visibility. Invest in the training and capacity building to make project teams have the needed know-how and competences in order to exploit technology to the maximum potential (Assaf & Al-Hejji, 2006). Stimulate a culture where members are encouraged to embrace a process of continual learning through implementing retrospectives, peer reviews, and lessons learned meetings. Urge the project teams to contribute in areas of strengthening, sharing of the best practices as well as awarding those who have excelled in order to enhance the learning and knowledge sharing process.

RESEARCH RECOMMENDATIONS

On the basis of this investigative work and data study, I want to put forward a list of several recommendations to those involved in megaprojects such as Neom and the entire construction industry – be they practitioners, policymakers or researchers. The recommendations lay such a foundation that will be a result of addressing the challenges and leveraging opportunities in the Agile methodology in infrastructure designing and building (Faridi & El-Sayegh, 2006).

1. **Customized Agile Framework:** Create a custom Agile approach that is specially tuned for the construction industry mega-projects that involves a lot of hearing and being in complex situations. This concept will elucidate the guidelines that should incorporate principles from existing Agile methodologies while also serving the purpose of mega-project like Neom in terms of scale, scope and regulatory control (Razek, Bassioni, & Mobarak, 2008).
2. **Stakeholder Engagement:** Set up a collaborative and involving culture in all the project stages, with engagement of stakeholders. Instill feedback and communication processes that will aid in facilitating alignments of project's aims and priorities among heterogeneous stakeholders which they are including government institutions, investors, contractors and local communities.
3. **Agile Training and Education:** Allocate for team and stakeholders' boring-based training to hone their Agile skills. Conduct Agile suitable training exercises on principles, practices and mac known tools, in order to implement it correctly at all levels of the project organization (Sweis, Abu-Hammad, & Shboul, 2007).

4. **Flexibility in Contractual Arrangements:** Stimulate flexibility in contractual arrangements to tolerate and comply with Agile modeling and philosophy. Design an applicable system of contract that enterprises shall be incited with collaboration learning, innovation, and cost multipurpose planning while addressing the risks of danger and uneasy environment change in leading projects.
5. **Technology Integration:** Technology and digital devices apply to Agile project management process. Invest in the latest projects management software, cooperation platforms, and data analytics solutions to aid in both the real time decision making and viewing process and to improve visibility and transparency (Akintoye, Beck, & Hardcastle, 2003).
6. **Continuous Evaluation and Improvement:** Introduce a feedback evaluation and resulting enhancement the Agile is applied in megalomaniac projects. Let's always schedule retrospectives, lessons learned sessions, and review performance to spot existing gaps and opportunities for optimisation, effectiveness, and process improvement from project kick-off to closure.
7. **Knowledge Sharing and Best Practices:** Help to organize the transfer of knowledge and the sharing of best practices between all stakeholders taking part in mega-development projects. Facilitate communities of practice, learning circles and business platforms to heuristically share the knowledge, Agile process stories and innovative approaches which can be used in general questions of agile technique in the construction industry (Ewer & Mustafa, 2008).
8. **Regulatory and Policy Support:** Propose the legal system and policy support in order to promote the introduction of Agile in mega ventures. Connect with the

government agencies, regulatory bodies, and the industry associations to show obstacles of regulation, simplify the approval processes, and enhance the agile friendly policies which could create an atmosphere where innovation and collaboration could prosper (Bakker & Wortmann, 2010).

9. **Research and Development Initiatives:** Build investment frameworks for researches and developments to promote Agile project management system in a construction industry. Attract scientific research, joint academic practices and gadgets development institutions designed to solve immediate problems, develop unique solutions and push the limits of agile construction management.

10. **Long-Term Sustainability:** Recommend sustainable and adaptable planning and implementation in case of mega-projects' development. Integrate environmental design principles, green building technologies, and climate change adaptation strategies into the Agile methodology so that infrastructure assets may remain in use longer and as a service to the environment (Nwagbogwu, 2011).

Through the implementation of these recommendations, the stakeholders can leverage Agile methods, rising above challenges, enabling better collaborations and leading to successful outcomes in mega ordo champion as well as Neom projects. By pooling efforts on adaptation, innovations, and collaboration the construction can consistently fit the Agile way of thinking as one of the building blocks for shaping the world in a sustainable way in the 21st century (Andrew J. Bates, 2009).

CONCLUSION

This thesis has been a complete study of the research results, the coding process conducted, the identified themes discovered and the particularities of a secondary analysis involving qualitative methods of research in the field of Agile project management in the construction industry, especially in mega projects such as NEOM in Saudi Arabia. Research findings were analyzed to draw tips for construction projects that are based on Agile methodology like flexible projects, joint stakeholder communication, iterative instead of linear development, adaptive planning and other items. These principles manifested themselves during construction projects with the context of the dynamic factors taken into account and the importance for cooperations among stakeholders. Besides, continuous learning remains as the major key to improving effectiveness. To begin with, coding systematically content our findings observed, pulling out the common themes and patterns that are relevant to agile projects management in construction. These themes include ideas as the ones that are concerned with the ways that may help to be successful by means of continuous improvement, cross-functional teams, transparency, as well as include the approach which puts clients first. Secondary data is reexamined using the qualitative data analysis approach which helps the researcher to obtain greatly important information related to the emerging of Agile methodologies in construction industry. In the study, the population is driven from a variety of sources and from a standpoint of qualitative data as well, such as academic articles, conference proceedings, reports, and case studies, aiming at the provision of a complete perception of Agile methodologies in construction. This thesis put the foundation for the future of analysis and research of Agile project management in the construction industry by offering interesting suggestions about

efficiency, drawbacks, and strategic ways of implementation on mega-projects size like Neom, Saudi Arabia.

كانت هذه الأطروحة عبارة عن دراسة كاملة لنتائج البحث، وعملية الترميز التي تم إجراؤها، والموضوعات المحددة المكتشفة وخصائص التحليل الثانوي الذي يتضمن الأساليب النوعية للبحث في مجال إدارة المشاريع في صناعة البناء والتشييد، وخاصة في المشاريع الضخمة مثل مثل نيوم في السعودية. تم تحليل نتائج الأبحاث لاستخلاص نصائح لمشاريع البناء التي تعتمد على منهجية Agile مثل المشاريع المرنة، والتواصل المشترك مع أصحاب المصلحة، والتطوير التكراري بدلاً من التطوير الخطي، والتخطيط التكيفي وعناصر أخرى. تجلت هذه المبادئ خلال مشاريع البناء مع مراعاة العوامل الديناميكية وأهمية التعاون بين أصحاب المصلحة. علاوة على ذلك، يظل التعلم المستمر هو المفتاح الرئيسي لتحسين الفعالية. في البداية، نقوم بالبرمجة بشكل منهجي لمحتوى النتائج التي لاحظناها، مع استخلاص المواضيع والأنماط المشتركة ذات الصلة بإدارة المشاريع الرشيقة في مجال البناء. تتضمن هذه المواضيع أفكاراً مثل تلك التي تهتم بالطرق التي قد تساعد على تحقيق النجاح من خلال التحسين المستمر، والفرق متعددة الوظائف، والشفافية، بالإضافة إلى تضمين النهج الذي يضع العملاء في المقام الأول. يتم إعادة فحص البيانات الثانوية باستخدام منهج تحليل البيانات النوعية الذي يساعد الباحث على الحصول على معلومات مهمة للغاية تتعلق بظهور منهجيات Agile في صناعة البناء والتشييد. في الدراسة، يتم اختيار السكان من مجموعة متنوعة من المصادر ومن وجهة نظر البيانات النوعية أيضاً، مثل المقالات الأكاديمية ووقائع المؤتمرات والتقارير ودراسات الحالة، بهدف توفير تصور كامل لمنهجيات Agile في البناء. وضعت هذه الأطروحة الأساس لمستقبل التحليل والبحث في إدارة المشاريع الرشيقة في صناعة البناء والتشييد من خلال تقديم اقتراحات مثيرة للاهتمام حول الكفاءة والعيوب والطرق الإستراتيجية للتنفيذ على المشاريع الضخمة مثل نيوم في المملكة العربية السعودية.

REFERENCES

1. Buller, A. (2017). Saudi Arabia announces \$500 billion city of robots and renewables. *Arab News*. Retrieved January 10, 2018, from <http://www.arabnews.com/node/1182501/saudi-arabia>
2. Carey, G., Nereim, V., & Cannon, C. (2017). Sun, sea and robots: Saudi Arabia's sci-fi city in the desert. *Bloomberg*. Retrieved January 12, 2018, from <https://www.bloomberg.com/graphics/2017-neom-saudi-mega-city/>
3. Dickinson, E. (2017). Saudi Arabia is betting its future on a desert city. *Foreign Policy*. Retrieved January 8, 2018, from <http://foreignpolicy.com/2017/11/03/saudi-arabia-is-betting-its-future-on-a-desert-megacity-neom-ga>
4. Discover Neom. (2017). *Vision*. Retrieved January 8, 2018, from <http://discoverneom.com/>
5. EDB. (2017). One stop-shop solution on FDI in Singapore. Retrieved January 3, 2018, from <https://www.edb.gov.sg/content/edb/en.html>
6. Ereli, A., & Karasik, T. (2017). How are sovereign wealth fund decisions made? *IndraStraGlobal*, 12, 1-8.
7. Estimo, R. C. (2016). KSA population: 21.1m Saudis, 10.4m expats. *Arab News*. Retrieved January 12, 2018, from <http://www.arabnews.com/saudi-arabia/news/875131>
8. Galbraith, J. R., & Kazanjian, R. K. (1986). *Strategy Implementation*. West.

9. Gavril, R. M., Olaru, M., Hell, C. R., & Grab, B. (2017). Manage collaborative partnerships through effective project management in the oil and gas industry. In *Proceedings of the 17th SGEM Vienna GREEN Conference* (pp. 321-328). ISBN 978-619-7408-26-3.
10. Hohan, A., Weber, G., & Rizea, C. (2014). Case study on implementing an information security management framework in a green energy production plant. In *Proceedings of the 3rd International Conference on Quality and Innovation in Engineering and Management* (pp. 241-247). ISBN 978-973-662-978-5.
11. IMF. (2017). *World Economic Outlook, October 2017. Seeking Sustainable Growth: Short-Term Recovery, Long-Term Challenges*. Retrieved January 10, 2018, from <https://www.imf.org/en/Publications/WEO/Issues/2017/09/19/world-economic-outlook-october-2017>
12. Ionescu, R. C., Ceausu, I., & Ilie, C. (2018). Considerations on the implementation steps for an information security management system. In *Proceedings of the 12th ICBE International Conference*, Bucharest.
13. Kelly, K., & Hubbard, B. (2017). Saudi Arabia is open for business, but not everybody's buying. *The New York Times*. Retrieved January 10, 2018, from <https://www.nytimes.com/2017/10/27/business/saudi-arabia-is-open-for-business-but-not-everybodys-buying.html>
14. Kingdom of Saudi Arabia. (2017). *Vision 2030: An Ambitious Nation Effectively Governed*. Retrieved January 12, 2018, from <http://vision2030.gov.sa/en/node/13>
15. Korybko, A. (2017). Saudi Arabia might recognize Israel because of NEOM. *Oriental Review*. Retrieved January 10, 2018, from

<https://orientalreview.org/2017/10/26/saudi-arabia-might-recognize-israel-because-of-neom/>

16. Lemaignan, S., Warnier, M., Akin Sisbot, E., Clodic, A., & Alami, R. (2017). Artificial cognition for social human–robot interaction: An implementation. *Artificial Intelligence*, 247, 45-69.
17. Leclerc, I. (2016). Saudi Arabia's Vision 2030 is going to fail. *Odysee*. Retrieved January 10, 2018, from <https://www.theodysseyonline.com/saudi-arabias-vision-2030-is-going-to-fail>
18. Lin, P. (2016). Relationships with robots: Good or bad for humans? *Forbes*. Retrieved January 3, 2018, from <https://www.forbes.com/sites/patricklin/2016/02/01/relationships-with-robots-good-or-bad-for-humans/#4d83acb47adc>
19. Mairs, J. (2017). Saudi Arabia to invest \$500 billion in fully automated city spanning three countries. *Dezeen*. Retrieved January 8, 2018, from <https://www.dezeen.com/2017/10/27/saudi-arabia-invest-500-billion-automated-sustainable-neom-city-egypt-jordan/>
20. Mellahi, K., Frynas, J. G., & Finlay, P. (2011). *Global Strategic Management*. University Press.
21. n.a. (2017). Saudi Arabia's Vision 2030. *Al Arabiyah*. Retrieved January 3, 2018, from <https://english.alarabiya.net/special-reports/saudi-vision-2030.html>
22. Nereim, V., & Shahine, A. (2017). Saudi Arabia crown prince details plans for new city: Transcript. *Bloomberg*. Retrieved January 12, 2018, from

<https://www.bloomberg.com/news/articles/2017-10-26/saudi-arabia-crown-prince-details-plans-for-new-city-transcript>

23. Nonneman, G. (2017). Saudi Arabian foreign policy: Conflict and cooperation. *Journal of Arabian Studies*, 7(1), 141-145.
24. Randow, J., & Look, C. (2017). ECB's follow-the-fed strategy set to change on QE exit road. *Bloomberg*. Retrieved January 13, 2018, from <https://www.bloomberg.com/news/articles/2017-10-24/ecb-s-follow-the-fed-strategy-set-to-change-on-road-to-qe-exit>
25. Torchia, A., & Rashad, M. (2017). Saudi Arabia avoids financial crisis - now for the hard part. *Reuters*. Retrieved January 10, 2018, from <https://www.reuters.com/article/us-saudi-economy/saudi-arabia-avoids-financial-crisis-now-for-the-hard-part-idUSKBN1801P0>
26. Olaru, M., Ionescu, R. C., Maftai, M., & Ilie, C. (2017). Application of Six Sigma tools for the improvement of information security management system. In *Proceedings of the 30th IBIMA Conference on Vision 2020: Innovation Management, Development Sustainability and Competitive Economic Growth*, Madrid, Spain.
27. The International Bank for Reconstruction and Development/The World Bank (IBRD/WB). (2011). *Special Economic Zones Progress, Emerging Challenges, and Future Directions*. Washington D.C.
28. Wald, E. (2017). The world's biggest IPO is coming: What you should know about Aramco. *Forbes*. Retrieved January 3, 2018, from

<https://www.forbes.com/sites/ellenrwald/2017/02/25/the-worlds-biggest-ipo-is-coming-what-you-should-know-about-aramco/#5efa934535fd>

29. Wheelen, T. J., & Hunger, D. J. (2002). *Strategic Management and Business Policy*. Prentice Hall.
30. Williams, D. (2017). Saudi Arabia vs. Iran: The long war continues. *Huffington Post*. Retrieved January 12, 2018, from https://www.huffingtonpost.com/daniel-williams2/saudi-arabia-vs-iran-the_b_8916488.html
31. *Barriers to Agile Adoption*. (2013, November 14). LeadingAgile. <https://www.leadingagile.com/2013/11/barriers-to-agile-adoption/>
32. Al-Khalil, M., & Al-Ghafly, M. A. (1999). Delay in public utility projects in Saudi Arabia. *International Journal of Project Management*, 17(2), 101–106.
33. Al-Kharashi, A., & Skitmore, M. (2009). Causes of delays in Saudi Arabian public sector construction projects. *Construction Management and Economics*, 27(1), 3–23.
34. Arab News. (2011, December 23). Projects worth SR550bn stalled, contractors ask govt to step in. *Gulf in the Media*.
35. Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International Journal of Project Management*, 24, 349–357.
36. Assaf, S. A., Al-Khalil, M., & Al-Hazmi, M. (1995). Causes of delay in large building construction projects. *Journal of Management and Engineering*, 11(2), 45–50.
37. Cannon, M. (2008, November 17). The key issues the construction industry will face in 2009. *Construction News*.

38. Cordsman, A. H. (2000). Saudi Arabia enters the 21st century V: Economic, demographic and social challenges (Working Paper 2000). Centre for Strategic and International Studies, Washington, DC.
39. Falqi, I. (2004). Delays in project completion: A comparative study of construction delay factors in Saudi Arabia and the United Kingdom (Master's thesis). Heriot-Watt University.
40. Faridi, A. S., & El-Sayegh, S. M. (2006). Significant factors causing delay in the UAE construction industry. *Construction Management Economics*, 24(11), 1167–1176.
41. Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). Causes of delay and cost overruns in construction of groundwater projects in developing countries: Ghana as a case study. *International Journal of Project Management*, 21, 321–326.
42. Razek, A., Bassioni, H. A., & Mobarak, A. M. (2008). Causes of delay in building construction projects in Egypt. *Journal of Construction Engineering and Management*, 134(11), 831–841.
43. Statistical Year Books. (2000). Department of Statistics Ministry of Finance and National Economy, Riyadh, Saudi Arabia.
44. Sweis, G., Abu-Hammad, A., & Shboul, A. (2007). Delays in construction projects: The case of Jordan. *International Journal of Project Management*, 26(6), 665–674.
45. Tucker, R. L., Haas, C. T., Glover, R. W., Alemany, C., Carley, L. A., Rodriguez, A. M., & Shields, D. (1999). Key workforce challenges facing the American construction industry: An interim assessment. Centre for Construction Industry Studies, University of Texas at Austin.

46. Loosemore, M., Raftery, J., Reilly, C., & Higgon, D. (2006). *Risk Management in Projects* (2nd ed.). Abingdon, Oxon: Taylor & Francis.
47. Akintoye, A., Beck, M., & Hardcastle, C. (2003). *Public Private Partnership: Managing Risks & Opportunities* (1st ed.). Oxford: Blackwell.
48. Mudau, R., & Pretorius, L. (2009). Project control and risk management for project success: A South African case study. *Proceedings of the Portland International Conference*, 1409–1414, Portland, OR.
49. Ewer, Y., & Mustafa, M. M. (2008). The impact of risk management on IS projects development and success in Syria. *Proceedings of International Conference on Telecommunication Technology and Applications*, 1–6, Damascus.
50. Perry, L.-A. (2007). The impact of risk management on the changing nature of principals' work (Ph.D. thesis). Queensland University of Education.
51. Bakker, K. B., & Wortmann, H. (2010). Does risk management contribute to IT project success? A meta-analysis of empirical evidence. *International Journal of Project Management*, 28(5), 493–503.
52. Abu Mousa, J. (2008). Risk management in construction projects from contractors' and owners' perspectives (Master's thesis). Islamic University of Gaza.
53. Luu, V., Kim, S., Tuan, N., & Ogunlana, S. (2009). Quantifying schedule risk in construction projects using Bayesian belief networks. *International Journal of Project Management*, 29(2), 209–219.
54. Wang, J., & Yuan, H. (2011). Factors affecting contractors' risk attitudes in construction projects: Case study from China. *International Journal of Project Management*, 29(2), 209–219.

55. Oztas, A., & Okmen, O. (2005). Judgmental risk analysis process development in construction projects. *Building and Environment*, 40(9), 1244–1254.
56. Zou, P., Zhang, G., & Wang, J. (2007). Understanding the key risks in construction projects in China. *International Journal of Project Management*, 25(6), 601–614.
57. Nieto-Morote, A., & Ruz-Vila, F. (2011). A fuzzy approach to construction project risk assessment. *International Journal of Project Management*, 29(2), 220–231.
58. Dikmen, I., Birgonul, M. T., Anac, C., Tah, J., & Aouad, G. (2008). Learning from risks: A tool for post-project risk assessment. *Automation in Construction*, 18(1), 42–50.
59. Karimi, A., Mousavi, N., Mousavi, S., & Hosseini, S. (2011). Risk assessment model selection in construction industry. *Expert Systems with Applications*, 38(2), 9105–9111.
60. El-Sayegh, S. (2008). Risk assessment and allocation in the UAE construction industry. *International Journal of Project Management*, 26(4), 431–438.
61. Pinto, A., Nunes, I., & Ribeiro, R. (2011). Occupational risk assessment in construction industry – Overview and reflection. *Safety Science*, 49(5), 616–624.
62. Bryan Scott Canada. (2009). The role of leadership and management skills in the development and success of construction project managers (Master's thesis). Arizona State University.
63. Boetti, V. (2008). Use of social network analysis as a tool to evaluate development and success on construction projects and team interactions (Master's thesis). University of Colorado.

64. Nwagbogwu, D. (2011). The correlation between project management effectiveness and project success (Ph.D. thesis). Walden University.
65. Andrew J. Bates. (2009). The owner's role in project success (Ph.D. thesis). Polytechnic University.
66. Culler, S., & Watson, E. (2009). The degree of relationship between critical development and success factors and information technology project performance (Ph.D. thesis). University of Phoenix.
67. Alkhathami, M. (2004). Examination of the correlation of critical development and success and delay factors in construction projects in the Kingdom of Saudi Arabia (Ph.D. thesis). University of Pittsburgh.
68. Zafar, H. (2010). Critical development and success factors for an effective security risk management program in an organization: An exploratory case study (Ph.D. thesis). The University of Texas.
69. Sweis, G., Sweis, R., Abu Hammad, A., & Shboul, A. (2008). Delays in construction projects: The case of Kingdom of Saudi Arabia. *International Journal of Project Management*, 26(6), 665–674.
70. Hillson, D. (2006). Integrated risk management as a framework for organizational success. *PMI Global Congress Proceedings*, Seattle, Washington.
71. Aaron, T., Shenhar, J., & Dvir, D. (2002). Risk management, project success, and technological uncertainty. *Journal of R&D Management*, 32(2), 101–109.
72. Didenko, I., & Konovets, I. (2008). Development and success factors in construction projects: A study of housing projects in Ukraine (Master's thesis). Umeå University.

73. Amr, A., El Nemr, H., & El Nemr, W. (2008). Claims management in the Egyptian industrial construction sector: A contractor's perspective. *Journal of Engineering, Construction and Architectural Management*, 15(5), 456–469.
74. Massingham, P. (2010). Knowledge risk management: A framework. *Journal of Knowledge Management*, 14(3), 464–485.
75. Holmes, T. (2011, June 4). What is the construction industry? WiseGeek. Retrieved from <http://www.wisegeek.com/what-is-the-construction-industry.html>
76. Acker, O. (2015). The digital future of creative Europe. Strategyand.pwc.com. Retrieved from <https://www.strategyand.pwc.com/media/file/The-digital-future-of-creative-Europe-2015.pdf>
77. Ah Kim, S., Yun Ryoo, H., & Joo Ahn, H. (2017). Student customized creative education model based on open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 3(1), 6. <https://doi.org/10.1186/s40852-016-0051-y>
78. Al Barqawi, A. (2017). This is why the NEOM project was named. Retrieved from <https://sabq.org/wS2szk>
79. Al-Maiman, M. (2012). Developing training programs to meet the needs of the labor market and address the problem of unemployment in the Kingdom of Saudi Arabia. *International Conference on the Integration of Education Outputs with the Labor Market in the Public and Private Sector*, Jordan, 25-28/3/2012. <http://wje.sciedupress.com> World Journal of Education Vol. 10, No. 4; 2020
Published by Sciedu Press 80 ISSN 1925-0746 E-ISSN 1925-0754

80. Al-Mohandes, A. (2016). The Kingdom's Vision 2030 and comprehensive development. Retrieved from <http://www.alriyadh.com/1151096>
81. Alzahrani, M. (2018). Appropriateness of the King Saud University Art Education Program's outputs for the needs of the Saudi labor market in accordance with Vision 2030. *Journal of Educational Sciences*, 30(3), 427-451.
82. Aref, A., Hegazy, A., & Abdel-Hamid, M. (2108). The quality of learning outcomes in Saudi universities and their role in meeting the requirements of the Saudi labor market, in accordance with Vision 2030. *Journal of Scientific Research in Education*, 19, 683-741.
83. Arntz, M., Gregory, T., & Zierahn, U. (2016). The risk of automation for jobs in OECD countries: A comparative analysis. Tech. Rep. 189, OECD Social, Employment and Migration Working Papers.
84. Bakhshi, H., Downing, J. M., Osborne, M. A., & Schneider, P. (2017). The future of skills: Employment in 2030. Pearson.
85. Basem, G. (2004). The contemporary technological revolution and its role in developing economic relations. Unpublished Master's Thesis, Tishreen University, Faculty of Economics, Syrian Arab Republic.
86. Bostrom, N. (2007). Technological Revolutions: Ethics and Policy in the Dark. In N. M. D. S. Cameron and M. E. Mitchell (Eds.), *Nanoscale: Issues and Perspectives for the Nano Century*, (John Wiley).
87. Brain, M. (2013). "Robotic Nation FAQ," on Marshall Brain's website. Retrieved from <http://marshallbrain.com/robotic-faq.htm>.

88. Byun, C. G., Sung, C. S., Park, J. Y., & Choi, D. S. (2018). A study on the effectiveness of entrepreneurship education programs in higher education institutions: A case study of Korean graduate programs. *Journal of Open Innovation: Technology, Market, and Complexity*, 4(3), 26. <https://doi.org/10.3390/joitmc4030026>.
89. California University of Pennsylvania. (2017). What can you do with a mechatronics degree. Retrieved from <https://www.calu.edu/academics/undergraduate/bachelors/mechatronics-engineering-technology/what-can-you-do-with-a-mechatronics-degree.aspx>
90. Cognizant's Center for the Future of Work. (2019). 21 Marketing jobs of the future: A Guide to getting and staying employed- in marketing- for the next 10 years. Retrieved from <http://www.marketersbyadlatina.com/uploads/pdf/-2237-21-Marketing-Jobs-of-the-future.pdf>
91. Crawford, M. (2017). Advanced Manufacturing Will Drive U.S. Economic Engine - Area Development. *Area Development*. Retrieved from <http://www.areadevelopment.com/EconomicsGovernmentPolicy/Summer2012/Advanced-Manufacturing-drives-USA-economic-engine-255422.shtml>
92. Damanhoury, H. (2013). Reasons for higher education outcomes not being matched to the requirements of the Saudi labor market. *King Abdulaziz University Journal: Economics and Management*, 27(1), 277-286.
93. Dell EMC. (2016). What it means for KSA future ready for vision 2030. Retrieved from <http://emeablog.emc.com/sa/dell-emc-merger-means-ksa-future-ready-vision-2030/>

94. DU Press. (2017). Making the future of mobility work: How the new transportation ecosystem could reshape jobs and employment. Retrieved from <https://dupress.deloitte.com/dup-us-en/deloitte-review/issue-21/transportation-ecosystem-future-of-mobility-reshaping-work.html>
95. Evans Data Corporation (EDC). (2018). Developer population growth shifts toward China, India and emerging countries. Retrieved from <https://evansdata.com/press/viewRelease.php?pressID=268>
96. Foundation for Young Australians (FYA). (2017). The new basics: Big data reveals the skills young people need for the new work order. Retrieved from http://www.fya.org.au/wp-content/uploads/2016/04/The-New-Basics_Web_Final.pdf
97. Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerization? *Technological Forecasting and Social Change*, 114, 254-280. <https://doi.org/10.1016/j.techfore.2016.08.019>
98. Ghada, S. (2003). The challenges of the contemporary scientific and technological revolution and its impact on obstructing human resources in the United Arab Emirates (Unpublished Master Thesis). Ain Shams University, Faculty of Commerce, Egypt.
99. He, L., Standen, P., & Coetzer, A. (2017). The perceived personal characteristics of entrepreneurial leaders. *Small Enterprise Research*, 24(2), 97-119. <https://doi.org/10.1080/13215906.2017.1334225>
100. International Experts and Local Economic Development Agencies (ILS LEDA). (2013). Most popular future jobs of 2030 -Elaboration from an article of

Italian magazine "Panorama". Retrieved from
[http://www.ilsleda.org/usr_files/documents/paper_highlights-aug2013-
best_jobs_2030_238456.pdf](http://www.ilsleda.org/usr_files/documents/paper_highlights-aug2013-best_jobs_2030_238456.pdf)

101. International Labour Organization (ILO). (2016). ASEAN in transformation: The future of jobs at risk of automation. Retrieved from
[http://www.ilo.org/public/english/dialogue/actemp/downloads/publications/2016/a
sean_in_transf_2016_r2_future.pdf](http://www.ilo.org/public/english/dialogue/actemp/downloads/publications/2016/asean_in_transf_2016_r2_future.pdf)

العنوان باللغة العربية

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في نيوم المملكة العربية السعودية**

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