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Agile in Construction Projects

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Chapter 1: INTRODUCTION

1.1 Background Information

Managers involved in construction projects are supposed to lead as well as manage their respective projects in their entire life-cycles. Due to the fact that construction projects carry a lot of risks, and unpredictable in nature it is not an easy task to manage them as a manager. According to Turner (2014) construction projects needs flexible leadership and management for purposes of responding to different changes that occur during their execution. As way of trying to deal with construction project management challenges over the year's managers have been using traditional methods of project management. However, due to weaknesses associated with traditional approaches of project management, agile project management technique was designed for purposes of being used in the construction industry (Turner, 2014). Nonetheless, it use has been faced by a number of obstacles and there is need of understanding these challenges with an objective of improving its use in the future so as to enhance the process of constructing project management. Minimum number of studies has been undertaken regarding obstacles associated with the use of agile in construction and designing projects. Hence, little knowledge concerning challenges associated with use of agile makes it application in designing and construction projects a challenge for many managers. Hence, this study has helped in addressing this problem by looking in depth the challenges of using agile in construction projects and ways in which the challenges can be addressed in the future.

1.2 Research Problem

Despite, the use of agile methodology in management of construction project, helping in addressing weaknesses associated with traditional methodologies of managing project, it usage is still experiencing some obstacles. The success of any construction related project largely depends on the designing and implementation process. However, there are huge obstacles in designing and construction projects. For example, an initially designed building may be forced to be changed, and this result in resource wastage. Also, obstacles of using agile methodology results in construction project failing. Therefore, there is need to carry out investigation on how the obstacles in designing and construction projects can be overcome in the future so as to enhance project management efficiency.

1.3 Decomposition of the Problem

The following research questions guided the data collection process so as to address the main research problem;

(i) How is the use of agile methodology important in the management of construction projects?

(ii) Which are the obstacles associated with use of agile methodology in designing and construction projects?

(iii) How can the obstacles associated with agile methodology in designing and construction projects be addressed so as to improve efficiency of managing construction related projects in the future?

1.4 Motivation

Construction projects are very expensive and their failure results in an individual or institutional investor losing huge amount of money in them. Hence, efficient management of

construction project is critical in ensuring that the desired outcomes are attained, especially efficient usage of available resources. The goal of this research is to investigate through which obstacles associated with the use of agile methodology in designing and construction projects can be fully addressed to enhance the success rate and efficient use of resources in designing and construction projects. The findings of the study are instrumental in enhancing the application of agile methodology in construction projects, thereby, reducing resource wastage and failure of some projects which encounters obstacles while using this project management methodology.

1.5 Key Terms Definitions

Architecture-The science and art associated with designing of buildings, bridges, roads and other construction structures.

Construction-is defined as the process of constructing an infrastructure or building.

Agile-is a project management methodology, whereby, major tasks are subdivided into smaller tasks supposed to be completed in phases.

Project management-is usually the field of planning, initiating, controlling, executing as well as closing work carried out by team to attain specific goals using a certain success criteria.

1.6 Problem Statement and Justification

The use of agile methodology in management of construction project faces some major obstacles that result in the collapse or inefficiency in use of the available resources. Thus, agile methodology application in the construction projects faces huge obstacles that needs to be addressed so as to enhance its abilities to make sure that project management is effective to reduce the chances of project failing or use huge financial, human and technical resources that would have otherwise being reduced. Solving this research problem experienced in construction project

management will make the process of running and managing projects in the future using agile methodology effective.

The main research deliverables involved in the research included writing a research proposal, carrying out literature review associated with the research problem, collect data from the field, analysis of the data from the field, and presentation of the study findings. In order to fully address the research problem, behavioral research was carried out, whereby, the behaviors of the project managers and the use of agile methodology was fully investigated to determine some of the obstacles experienced by the participants. Based on the experiences and behaviors of the participants possible solutions to the problem were developed.

The main limitation of this study is that small data sample has been used. The use of small data sample has a negative implication on the reliability and validity of the study findings. In addition, the bias of the study participants might is also a major limitation during the completion of the study as it impact on the quality of the data collected in terms of its accuracy reducing its reliability (Cohen, Manion and Morrison, 2013).

Chapter 2: LITERATURE REVIEW

2.1 Agile Management

According to Turner (2014) agile is an incremental, interactive technique of managing the building and designing activities of information technology, engineering as well as other business fields that aims at providing a new service or product in a highly interactive and flexible manner. Agile provides phases that are supposed to be followed in the process of developing and managing a given project, such as software development (Chow and Cao, 2008). Agile management usually requires people with appropriate skills and experience so as to successfully use it while managing

different types of projects (Chen, 2004). Turner (2014) points out that agile management in most cases is viewed as broadening as well as generalization of principles that have in the past being successfully used in software development in other areas of project management in the world of business.

Agile project management indicates that a project is supposed to be undertaken using different phases for it to be successful. The first phase is feasibility study, where detailed studies are carried out to determine the costs and benefits of a project. After feasibility study reveals that a project is viable, the next phase according to Chen (2004) the design phase, where the product to be produced is designed, with appropriate features. The next phase is the construction stage, where the building or infrastructure constructing takes place (Turner, 2014). The last phase is construction management is the closing phase, where the project is fully evaluated to determine whether the intended outcomes are attained or not (Hoda, Noble and Marshall, 2008). The last phase is concerned with determining whether project costs were maintained or due to changes the cost ended being high than initially planned.

2.2 Benefits of Using Agile Management

The existing literature indicates that there are numerous benefits that are associated with the use of agile methodology in construction projects. According to Turner (2014) use of agile in project management play a significant role in reducing the cost associated with implementation process. Hoda, Noble and Marshall (2008) indicate that agile provides well articulated process that should be followed by a manager, and the processes help in avoiding mistakes that can increase the cost of a project. Therefore, the various phases of agile management, such as designing play a significant role in helping to reduce possible unplanned issues that can result in project costs being high. Additionally, Chen (2004) indicates that use of agile methodology play

a significant role when it comes to enhancing the quality of the end product. The steps followed in agile methodology ensures that project implementation follow certain standards that are instrumental in making the end product of high quality (Turner, 2014).

Gustavsson (2013) points out that the use of agile management in construction projects play an important role when it comes to satisfaction of the clients and businesses. Turner (2014) indicates that the goal of any project management process is to ensure both the interests of the business and clients are fully meet. Hence, the use of agile management provides project managers with an opportunity of putting in place measures that facilitate attainment of the client's needs during project management process (Chen, 2004). Turner (2014) further indicates that the use of agile management play a significant role when it comes to making sure that projects are highly productive. It ensures that the needs of the employees in a project are well taken care of, by putting in place of communication measures and other strategies aimed at building a satisfied and motivated workforce (Drury, Conboy and Power, 2012).

2.3 Obstacles of using Agile

According Turner (2014) flexibility restriction is a major obstacle associated with agile management. When using agile in projects with strict scope and fixed deadline it is impossible to allow for flexibility which is a critical cornerstone of agile methodology (Chen, 2004). On the other hand, Gustavsson (2013) points out that regulatory and contractual issue impacts negatively on the application of agile in project management in an effective manner. Contractual as well as the regulatory issues impacts the ability of allowing flexibility in certain areas of project management which are critical in ensuring that agile management is an effective tool of managing projects (Turner, 2014). For example, if contractual obligations require that costs

should not exceed a certain level, then the project manager is forced not to make changes in certain project design related features due to the fear of making the costs higher than the anticipated ones as this will be violation of the contract (Gandomani et al, 2013). Drury, Conboy and Power (2012) indicate that making decisions concerning various phases associated with agile project management is an obstacle facing the use of this methodology in running of projects. For example, confusion on whether to continue with a project when it design face is encountered with challenge or to restart the entire project planning process (Drury, Conboy and Power, 2012)

In addition, Guastavsson (2013) indicates that business interest conflicts are major obstacles that make the use of agile management ineffective in certain projects. The business interest may be conflicting with the interests of the project, and in most cases the business interests supersedes business interests. Additionally, conflicts between various phases might result in the use of agile management being ineffective in any form of project, for instance in the construction projects (Turner, 2014).

2.4 Gaps in the Existing Literature

According to Dybå, Dingsøyr and Moe (2014) the existing literature on agile methodology only focuses mainly on its positive when it comes to project management. Hence, little attention has been given to its weaknesses when being applied in management of projects, such as construction projects. The main gap in the existing literature is that there no adequate information concerning ways in which the existing obstacles to the use of agile in construction projects can be overcome (Vijayasarathy and Turk, 2008). Thus, there is need to carry out a research that aims at bridging this gap in the literature on the use of agile methodology in construction projects. The research should help to generate academic information on the major

obstacles associated with the use of agile in construction projects and the way these challenges can be overcome in the future. Buschmann et al (1996) points out that understanding ways in which challenges that make it difficult in applying agile in project management can enhance the process of making it useful in architecture related projects in the future. This study aims at addressing the gap in the literature by highlighting some of the ways in which agile application obstacles in the construction sector can be fully overcome to enhance project management using this methodology.

2.5 Why the Existing Literature Review has not addressed the problem

The existing literature has not successfully managed to address the problem of obstacles associated with the use of agile methodology in management of construction projects due to the fact that most of the studies have focused mainly on the benefits of using agile methodology and success factors associated with its application in project management (Cohn, 2010). Therefore, there is need of carrying out a comprehensive research that focuses basically on the challenges associated with utilization of agile methodology in management of construction projects.

Chapter 3: METHODOLOGY

3.0. Research Approach

The study employed qualitative research methods. Thus, different concepts associated with qualitative research methodology were used in the data collection as well as analysis process so to comprehend obstacles experienced while using agile in designing and construction projects and how the issue can be resolved. According to Taylor, Bogdan and DeVault (2015) qualitative methods involves the participants of a research providing detailed account related to

attitude and experiences they have connected to the study problem. Qualitative methods were employed as they helped in giving the study participants an opportunity to give personalized experience concerning their attitude and perceptions associated with the use agile methodology in designing and construction projects.

3.1 Research Design

The descriptive research design was used in this study. According to Taylor, Bogdan and DeVault (2015) descriptive is study design where the research respondents provide precise accounts of the experiences they have with a certain study problem. The descriptive research design was suitable for qualitative research, making it suitable for this study on agile in construction projects. The use of this design played an instrumental role in helping in collection of accurate data from project managers on the challenges they experience when using agile in designing and construction projects.

3.2 Sample Size and Sampling Method

The study used a sample of 20 project managers who uses the agile methodology in management of their construction projects. The research target population was construction managers in the U.S. The project managers dealing with construction projects were in a better position to explain the experience they have using agile methodology in management of their construction projects.

Furthermore, the study used the purposive sampling method. According to Creswell (2013) the purposive sampling method is concerned with selecting participants who have certain features. The participants who were expected to take part in the study must be construction

project manager, thus, the application of the random sampling approach cannot be suitable for this research.

3.3 Data Collection Method

The researcher used interviews data collection tool. The interviews were conducted through telephones. The interview involves participant being asked specific questions related to the subject of the study and providing answers to them (Creswell 2013). The interview approach was suitable for this study as it is flexible in nature compared to other data collection techniques. The data collection process involved first selecting the study participants. Then, the participants were called during the scheduled time for the interview and they will answer the questions related to the use of agile in their management of construction projects. The interviews were guided with questions that are contained in the appendix part. The questions that were asked to the study participants and the answers provided formed the basis resolving the main research problem.

3. 4 Data Analysis

Content data analysis method was used in this study. The major themes were used as the basis of analyzing the data collected from the field. The main themes used in data analysis process included benefits of agile in construction projects, obstacles of using agile in construction projects and ways in which obstacles to using agile in construction projects can be successfully dealt with by project managers.

3.5 Ethical Issues

In this research several ethical issues were experienced. The first ethical issue was in relation to honesty and integrity. In order to ensure that honesty and integrity is observed, the

information presented in this study was accurate as providing from the primary or secondary sources without any form of changes being made (Creswell, 2013). Also, the ethical issue of copyright was observed by making sure information used from secondary sources is properly cited. Furthermore, all the study participants were only allowed to take part in the study after fully understanding the main issues of the study, such as how the data collected from them was used, and the participants were supposed to sign an informed consent form before they could be allowed to participate in the study.

Chapter 4: DATA ANALYSIS

This section provides detailed information concerning the data collected from the study participants through the interview process. The data has been analyzed based on three major themes, namely, benefits of agile in construction projects, obstacles of using agile in construction projects and ways in which obstacles to using agile in construction projects can be successfully dealt by project managers.

4.1 Participants

The total number of participants in this study was a total of 20 project managers. The managers were drawn from 20 different construction projects in the U.S. The main aim of ensuring that the participants come from different projects was to ensure that the study provided reliable and accurate information concerning the obstacles experienced by project managers while using agile in construction and designing projects. 15 of the participants were male, while 5 of the participants were female. The table below summarizes the gender/sex of the study participants:

Sex/Gender	Number of Participants
Female	5
Male	10

Table 1: Participants gender representation

Additionally, the study participants were drawn from different generations, in terms of age. There were millennia's and baby boomers who participated in the study. 5 of the study participants were aged between 25-30 years. On the other hand, 10 of the participants were aged between 31-45 years. The remaining 5 participants were aged between 46-65 years. The table below summarizes the age composition of the study's participants;

Age Composition	Number of participants
24-30 years	5
31-45 years	10
46-65 years	5

Table 2: Age composition of the study's participants

4.2 Theme 1: benefits of agile in construction projects

The study participants were asked questions that related to the benefits that are associated with the use of agile methodology in construction and designing projects. The table below indicates the major benefits identified by the study participants associated with application of agile in construction and designing projects;

Benefits	Positive	Negative
Reduction in project costs	80%	20%

Improved project productivity	75%	25%
Quality	86%	14%
Client/Business satisfaction	77%	23%

Table 3: Benefits of using Agile in construction projects

4.3 Theme 2: obstacles of using agile in construction projects

The study participants were asked questions related to obstacles they encounter when it comes to project management using agile methodology. The table below provides major obstacles that were identified by the study participants as associated with the use of agile methodology in construction and designing projects;

Obstacles	Positive	Negative
Lack of flexibility	90%	10%
Business interest conflicts	82%	18%
Regulatory issues	87%	13%
Expensive to implement	70%	30%
Difficult to use where one time solution is needed	60%	40%

Table 4: Obstacles associated with using agile in construction projects

4.4 Theme 3: and ways in which obstacles to using agile in construction projects can be successfully dealt with by project managers

The participants of the research were asked to provide ways in which they try to overcome obstacles to using agile management in construction and designing projects. The table

below summarizes the major strategies they indicate they use during the process of managing obstacles of using agile management in construction related projects;

References

[1] Buschmann, F., et al (1996). *Pattern-Oriented Software Architecture, Vol. 1: A System of Pattern*. John Wiley and Sons

[2] Hoda, R., Noble, J., & Marshall, S. (2008, April). Agile project management. In *New Zealand Computer Science Research Student Conference* (Vol. 6, pp. 218-221).

[3] Highsmith, J. (2009). *Agile project management: creating innovative products*. Pearson Education.

[4] Dybå, T., Dingsøyr, T., & Moe, N. B. (2014). Agile project management. In *Software project management in a changing world* (pp. 277-300). Springer Berlin

[5] Chin, G. (2004). *Agile project management: how to succeed in the face of changing project requirements*. AMACOM Div American Mgmt Assn.

[6] Taylor, S. J., Bogdan, R., & DeVault, M. (2015). *Introduction to qualitative research methods: A guidebook and resource*. John Wiley & Sons.

[7] Cohen, L., Manion, L., & Morrison, K. (2013). *Research methods in education*. Routledge.

[8] Turner, J. R. (2014). *The handbook of project-based management* (Vol. 92). New York, NY: McGraw-hill.

[9] Creswell, J.W., (2013). *Research design: Qualitative, quantitative, and mixed methods approaches.* Sage publications.

[10] Gustavsson, T. (2013). *Agile-konsten att slutföra projekt*. TUK Förlag AB.

[11] Cohn, M. (2010). *Succeeding with agile: software development using Scrum*. Pearson Education.

[12] Drury, M., Conboy, K., & Power, K. (2012). Obstacles to decision making in Agile software development teams. *Journal of Systems and Software*, *85*(6), 1239-1254.

[13] Chow, T., & Cao, D. B. (2008). A survey study of critical success factors in agile software projects. *Journal of systems and software*, *81*(6), 961-971.

[14] Vijayasarathy, L. E. O. R., & Turk, D. (2008). Agile software development: A survey of early adopters. *Journal of Information Technology Management*, *19*(2), 1-8.

[15] Gandomani, T. J., Zulzalil, H., Ghani, A. A. A., Sultan, A. B. M., & Nafchi, M. Z. (2013). Obstacles in moving to agile software development methods; at a glance. *Journal of Computer Science*, *9*(5), 620.

Appendix One-Interview Survey Questions

This question contains questions that will be asked by the researcher during the interview process, helping to collect data that will aid to address the research problem.

1. Why do you prefer the use of agile methodology in construction and design projects over other project management methodologies?
2. Do you feel agile methodology effectively aid to successfully manage construction and design projects as a manager?
3. How is the use of agile methodology important in the management of construction projects?
4. Which are the obstacles associated with use of agile methodology in designing and construction projects?
5. Do these obstacles affect the success of construction and designing projects while using agile methodology in their management?
6. How can the obstacles associated with agile methodology in designing and construction projects be addressed so as to improve efficiency of managing construction related projects in the future?
7. Do you believe the use of the measures you have mentioned can successfully make the management of designing and construction project using agile methodology a success in the future?