

Utilization of Agile Project Management Methodologies and the Success of Software Development Projects at Flock of Birds Uganda

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Abstract

This study examines the effect of utilizing agile software development methodologies on the success of software development projects at Flock of Birds, Uganda. This was prompted by low success rates of software development projects despite employing agile methodologies. The study specifically sought to: investigate the effect of utilizing agile project management methodologies on continuous development of software products at Flock of Birds, Uganda; examine the effect of utilizing agile project management methodologies on timely delivery of software projects at Flock of Birds, Uganda; and to determine the effect of utilizing agile project management methodologies on teamwork at Flock of Birds, Uganda. Using a cross sectional design, data was collected from 110 respondents using questionnaires and interview guides. The study found out that using agile software development methodologies has a significant positive effect on continuous development, early delivery and teamwork on software development projects. The study concluded that using agile software development methodologies improves the success of software development projects. The study recommends that management Flock of Birds should continuously utilize agile software development methodologies in order to improve software development project opulence.

Key words: *Agile software development, Agile project management methodologes, Flock of Birds, Uganda*

Introduction

Business needs for process improvement projects are changing. Organizations expect faster deliverables from their investments; they want their improvement projects to adapt to and follow changing business needs and be more engrained with the organizational way of working. The agile way of working, now used more and more in software development, contains several mechanisms that support these business needs. Therefore, the question is: Could a process improvement project be performed in an agile way and what would be the benefits? (Linders, 2011). The advent of agile project management was in the year 2001, when some prominent software process practitioners arrived at a consensus on "How software development trends could produce better results?" The outcome was the Agile Alliance and the Manifesto for Agile Software Development, stating that: the "highest priority is to satisfy the customer through early and continuous delivery of valuable software" (Agile manifesto, (2001), Beck et al., 2001a, 2001b).

Flock of Birds (FoB), the case study for this research, is a Ugandan design firm with roots in the Netherlands. It was established in February 2012 basically as an Art Shop and in September 2013 the Information Communication Technology (ICT) strand of the organization was born (Flock of Birds, 2017). The interest for this study is the Information Communication Technology of the organization where they basically major in Software Engineering and they use a mixture of methodologies in project management to ensure they achieve their product or project goals. One of the most common methods they employ is the Agile Methodology and in some cases where a client needs so, they apply Waterfall. This case study is vital because they try to use different methods to achieve their goals, making it a more palatable organization to deal with by virtue of their experience with most of the methodologies in question that will help explain this study.

Agile project management software development methodologies have witnessed increased usage among multinational information technology companies since its inception two decades ago. The main driving factor for adoption of methodologies such as scrum, lean and Kanban etc, is the emergence of self-organizing teams, reduction of the amount of documentation which translates to more time for productive tasks as well as collaboration.

Some big developers such as game studios have achieved successful production of their solutions courtesy of agile methodologies. Agile has enabled these studios to prioritize on the important features to develop, meeting expected deadlines and effort required in terms of human resources.

Agile heavily depends and focuses on face-to-face and active communication within collaborating teams. This has increased the interest in using agile approaches thus ensuring that a small firm is able to become a software powerhouse. This is because, through agility, the company can continuously develop software and make early deliveries as a result of teamwork (Alzoubi & Gill, 2014).

Regional companies have not been left behind in using agile methodologies. With the transformation of agile continuing to expand, new tools have emerged that help users to collaborate and keep track of the progress. Laanti et al. (2011) acknowledge that the strength of empirical evidence on the usage of agile methods in Africa is relatively low and scarce. They discovered that 76% of ASDMs being used is almost exclusively focused on XP and the remaining percentage is for the other methods.

Ferreira and Cohen (2008) state that empirical research on the use of agile software development methodologies is sparse. To contribute to the empirical data in South Africa, Ferreira and Cohen (2008) carried out research using 59 development projects that used ASDM practices (iterative development, continuous integration, collective ownership, test-driven design and feedback). The results were strongly positive and showed that stakeholders were satisfied with the development process and the outcome of the projects.

Goulven (2015) argues that in Africa, most regional organizations are lagging behind when it comes to adoption of agile. This is because new technologies keep being invented that change the delivery timelines as well as composition of teams. In Uganda, there exist technological development gaps such as affordable computing devices as well as infrastructural gaps such as power and affordable internet connection which is imperative for successful agile project management and software development

(Kwesiga, 2012). Therefore, continuous development and early delivery of software is largely inhibited which makes the available IT companies adopt traditional methods such as waterfall. Such methods encourage little or no teamwork since development is linear and there is no room for improvement or consultation because requirements hardly change (Kwesiga, 2012). Developers at higher institutions of learning like Makerere University are using agile project management methodologies (Kwesiga, 2012). However, despite a few scanty reports on utilization of agile methodologies, empirical research on the use of agile software development methodologies in Uganda is sparse. This study therefore sought to assess the effect of utilizing agile methodologies on the success of software development projects at Flock of Birds Uganda.

Problem Statement

Efforts to improve utilization of agile project management methodologies to increase the opulence rate on projects in the Software industry began globally mostly after the Agile Alliance meeting in Utah, 2001 (Agile Manifesto, 2001). The Agile Project Management wave has been sweeping towards Africa and by mid-2000s South Africa became a lead industry in utilizing agile development process which gave birth to agile project management in Africa (FTI, 2012). A few companies in Uganda started utilizing this methodology in 2010s and this after Project Management Institute with the Local Organizing Committee started organizing Agile Project Management Certification courses in Uganda, the inaugural one being in Kira (PMI-ACP Certification Training, 2011). Flock of Birds having its roots in the Netherlands and with operations in Germany, Poland, South Africa and Curacao Islands took it to another level by making it its standard practice from 2013 to date.

It is hypothesized that utilization of agile project management methodologies enhances software development by increasing continuous development, timely delivery and enhancing teamwork. In a bid to improve software development at Flock of Birds, management and software developers have embraced the use of agile project management methodologies. Despite this, the success of software development projects is still low as evidenced by late completion of projects and low-quality outputs (Flock of Birds, 2017). This study therefore sought to examine the effect of utilizing agile project management methodologies on the success of software projects at Flock of Birds. Without this knowledge, the quality of software development projects may continue deteriorating and eventually result in business losses for the organization.

This study therefore basically employed descriptive and exploratory research to guide on ascertaining the trend in agile project management

Objectives of the study

- To investigate the effect of utilizing agile project management methodologies on continuous development of software products at Flock of Birds, Uganda
- To examine the effect of utilizing agile project management methodologies on timely delivery of software projects at Flock of Birds, Uganda.
- To determine the effect of utilizing agile project management methodologies on team work at Flock of Birds, Uganda.

Conceptualization

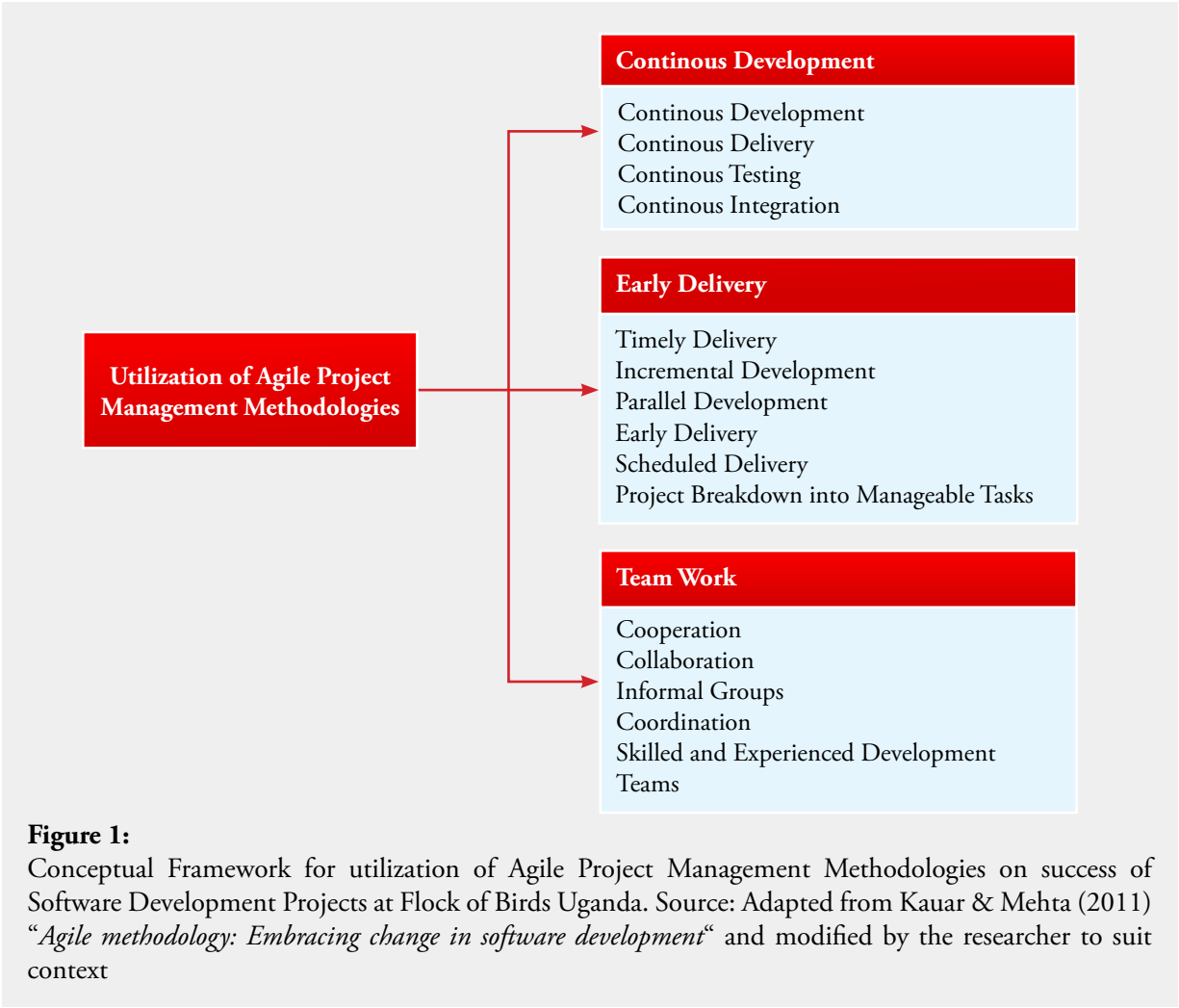


Figure 1:
Conceptual Framework for utilization of Agile Project Management Methodologies on success of Software Development Projects at Flock of Birds Uganda. Source: Adapted from Kauar & Mehta (2011) "*Agile methodology: Embracing change in software development*" and modified by the researcher to suit context

The conceptual framework above explains how the independent and dependent variables are related to each other. In this study, agile practices, through promotion of continuous development, early delivery and promotion of teamwork encourage utilization. If the output of adopting agile practices is positive, then project managers will prefer adoption of agile project management including investing in skills that ensure continuous development and early delivery and vice versa. Kaur and Mehta (2011) used this frame to explain the changing trend in project management in New Delhi, India. As the researcher, I modified their frame to include more constructs on the dependent variable, but still explaining a trend in agile project management in Ugandan context.

Justification of the study

Agile project management research has been accomplished in specialized industries such as construction, engineering, and information technology, and these larger industry sectors have been able to increase the value of project processes with the application of formalized project management methods (Thomas and Mullaly 2008). More recently, industry sectors that do not traditionally have a history of agile project management are also investigating whether these management practices can bring about improved project success (Carden and Egan, 2008). This is primarily due to the fact that practitioners in these emerging fields have witnessed the results achieved through the use of agile project management, such as better utilization

of resources and scheduling. These organizations have also seen that improved project success can result in fewer business disruptions, allowing them to concentrate on their primary objectives (Thomas and Mullaly, 2008). Not only are organizations benefiting from using agile project management for building products and delivering solutions for external clients, but internally, the value of agile project management for the control of IT project delivery and execution has been acknowledged, and has also become a topic of research in the past few years. Many of these recent studies have centred around researching large and complex IT projects (Glass, 2006a; Shore, 2005), the uptake of risk management in large IT projects (Cooper et al., 2005; Kappelman, McKeeman, and Zhang, 2006), or improving control of software development projects (Bechtold, 1999; El Emam and Koru, 2008). However, little effort seems to have been invested into the area of IT integration and migration projects, especially when these projects are encountered in an SME environment. Projects involving IT implementation are an area of IT that nearly every organization must deal with. This type of project can comprise such tasks as integrating a new ERP (Enterprise Resource Planning) system into the current IT infrastructure, moving server installations from physical to virtualized hardware, or planning and introducing a new group collaboration portal, to list but a few examples.

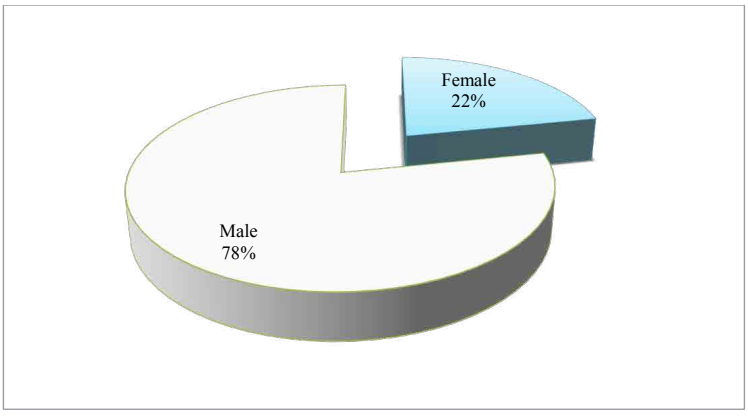
It is critical that the effect of utilizing agile project management methodologies on the success of software development projects is understood by the software development companies. Without clear understanding of these factors, organizations may continue relying on more traditional approaches which are less effective and efficient. This may affect the performance and profitability of the organizations. Given this background, it was important to conduct a study to examine the effect of utilizing agile project management methodologies on the success of software development.

Findings

The respondents' demographic characteristics in terms of level of education and length of service in the organization are presented in Table 1.

Gender of the respondents

Figure 2: Gender of the Respondents



According to the results in ***Figure 2***, most 86(78%) of the study respondents were male and 24(22%) were female. This means that most of the developers at Flock of Birds are male. In comparison with research done by Stack Overflow in 2015 in a report by Roose (2015), this result tallies this study's findings as indicated in the Figure 3 below. According to the study 92.1% were identified as male and 5.8% as female from an online survey covering 157 countries.

Age of the Respondents

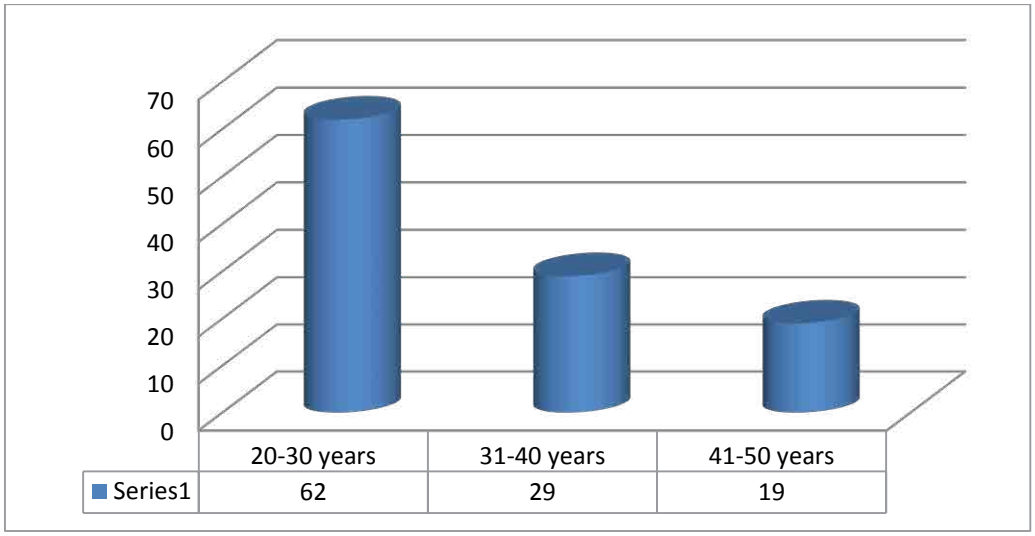


Figure 3: Respondents' Age

The results in ***Figure 3*** indicate that most 62(56.4%) of the study respondents aged between 20 and 30 years, 29(26.4%) were aged between 31 and 40 years and only 19(17.3%) were aged between 41 and 50 years. This means that most of the software developers and project managers at Flock of Birds are in their most productive age group.

Length of Service

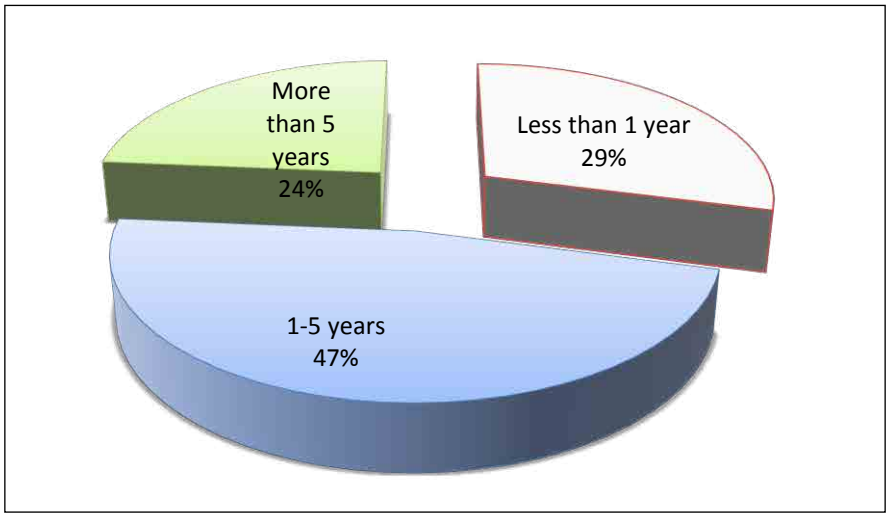


Figure 4: Working Experience

As can be seen in ***Figure 4***, almost half 52(47%) of the study respondents had worked with the organization for a period of between 1 and 5 years, followed by 32(29%) who had worked for a period of less than 1 year and lastly by only 26(24%) who had worked for more than five years. The above findings indicate that most of the software developers and project managers at Flock of Birds have adequate working experience.

Level of Education

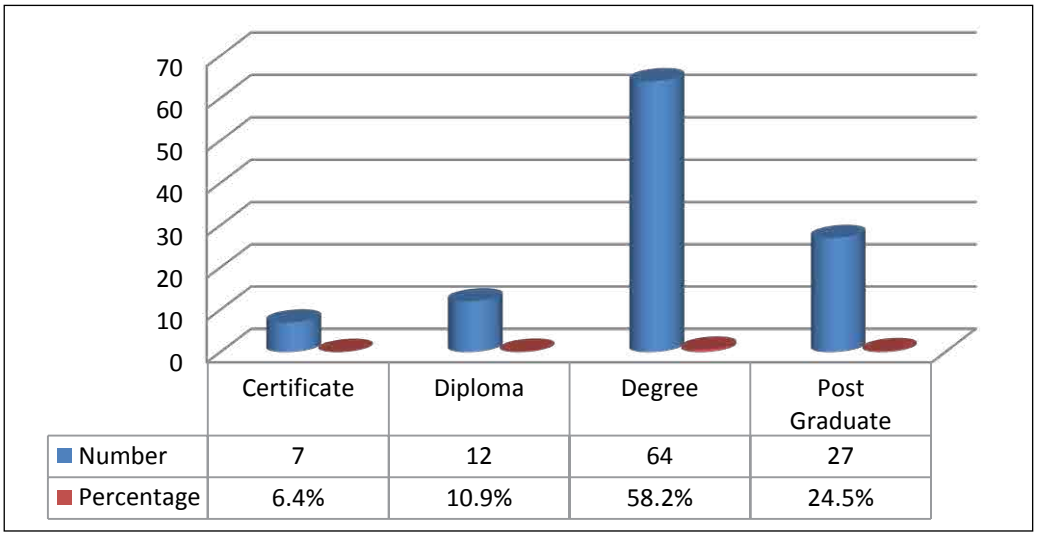


Figure 5: Level of Education

According to the results in ***Figure 5*** above, more than a half 64(58.2%) of the study respondents were educated up to Bachelor's Degree level, followed by 27(24.5%) who were educated up post graduate degree level and by 12(10.9%) who were educated up to Diploma level, while only 7(6.4%) were educated up to certificate level. The results indicate that the staff at Flock of Birds are adequately educated and could therefore be relied on to provide credible information on the topic under investigation.

Experience with Agile Project Management Methodologies

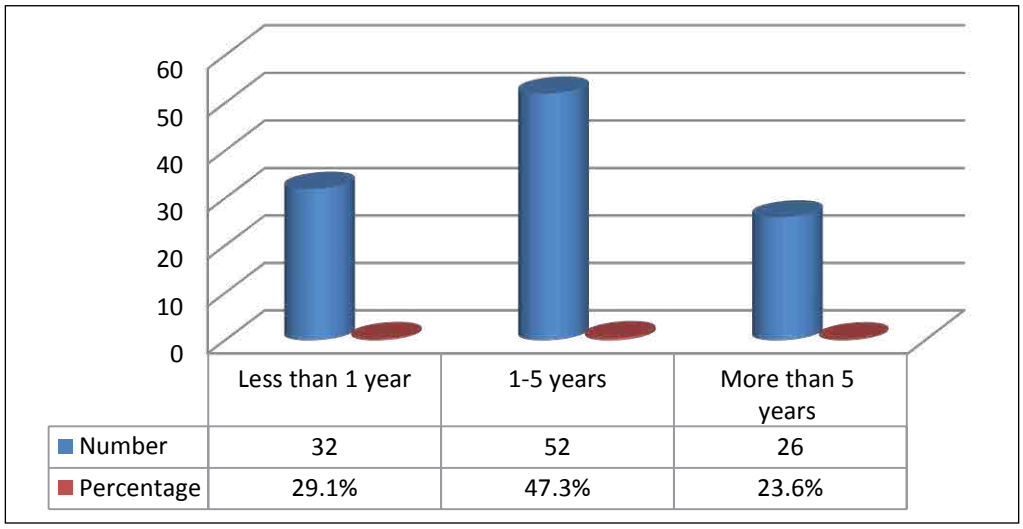


Figure 6: Experience with Agile Project Management Methodologies

As clearly indicated in Figure 6, almost a half 52(47.3%) of the study respondents had used agile project management methodologies for a period of less than 1 year, followed by 26(23.6%) who had worked with agile methodologies for a period of more than 5 years and by only 26(23.6%) who had worked with the agile methodologies for more than 5 years. The above findings indicate that most of the software developers and project managers at Flock of Birds have used agile project management methodologies for a reasonable time and they could therefore be relied upon to provide credible information on the topic under investigation.

The effect of utilizing agile project management methodologies on continuous development of software products at Flock of Birds, Uganda

The first objective of the study was to assess the effect of the utilization of agile project management methodologies on continuous development of software at Flock of Birds. To achieve this objective, the respondents were asked to respond to a number of statements regarding the effects of agile project manageme nt methodologies on the continuous development of software projects at Flock of Birds. This objective was analysed by using descriptive statistics namely the mean and the standard deviation. The mean portrays the average response on a statement and standard deviation portrays the extent to which scores deviate from the mean. The interpretation scale was; 1.00 – 1.80 (strongly disagree), 1.81 – 2.60 (disagree), 2.61 – 3.40 (moderately agree), 3.41 – 4.20 (agree) and 4.21 - 5.00 (strongly agree). The results are summarized in Table 1.

Table 1: Responses on continuous development

According to the results in Table 1 above, the study respondents agreed that using agile project management in software development enhances

Statement	Mean	Standard Deviation	Interpretation
Using agile project management methodologies enhances continuous integration in software development at Flock of Birds	4.47	1.02	Strongly Agree
Using agile project management methodologies enhances continuous delivery in software development at Flock of Birds	4.32	1.00	Strongly Agree
Using agile project management methodologies enhances continuous testing in software development at Flock of Birds	4.20	1.02	Agree
Using agile project management methodologies enhances continuous deployment in software development at Flock of Birds	4.17	1.02	Agree
Using agile project management methodologies enhances customer satisfaction	3.86	1.07	Agree
Using agile project management methodologies for software development enhances customer product quality	3.84	1.03	Agree
Using agile project management methodologies for software development enhances efficiency	3.72	1.20	Agree
Using agile project management methodologies for software development enhances effectiveness	3.70	1.03	Agree

continuous integration (Mean= 4.47, SD= 1.02). The study respondents also noted that agile project management methodologies enhance continuous delivery in software development at Flock of Birds (Mean= 4.32, SD= 1.00).

As clearly indicated in Table 2, the study respondents noted that using agile project management methodologies enhances continuous testing in software development at Flock of Birds (Mean= 4.20, SD= 1.02). They also noted that agile project management methodologies enhance continuous deployment in software development at Flock of Birds (Mean= 4.17, SD= 1.02) and that it also enhances customer satisfaction (Mean= 3.86, SD= 1.07).

The study respondents noted that using agile project management methodologies for software development enhances product quality (Mean= 3.84, SD= 1.03). It was also indicated that using agile

project management methodologies for software development enhances efficiency (Mean= 3.72, SD= 1.20) and that it also enhances effectiveness (Mean= 3.70, SD=1.03). This finding was reinforced by one key informant who noted that:

> *I use it a lot. I have actually made it part and parcel of my practice. There's a lot of value associated with APM as compared to traditional project management and I will definitely embrace this lean process to enable faster decision making, feature driven approach to achieve faster goals without delay of sequential process flows (Key Informant Interview).*

Hypothesis One: Agile project management methodologies have a significant effect on software development projects

In order to determine the effect of using agile project management methodologies on the success of software development projects, correlation and regression analysis were conducted. The results are summarized in Table 3.

Table 2: Correlation results showing the relationship between agile project management and continuous development

		Agile Project Management	Continuous development
Agile Project Management	Pearson Correlation	1	.462**
	Sig. (2-tailed)		.000
	N	110	110
Continuous development	Pearson Correlation	.462**	1
	Sig. (2-tailed)	.000	
	N	110	110
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary Data

According to the results in Table 2, utilizing agile project management methodologies and continuous development projects were found to have a significant positive relationship where the correlation coefficient (r) = 0.462 and the ρ value of 0.000 is less than the chosen alpha (α) level of 0.05 (ρ values which are less or equal to alpha levels of 0.05 are considered to be significant while those which are more than 0.05 are considered to be insignificant as suggested by Sekaran (2003). Hence with these findings, hypothesis one is accepted. This means that utilizing agile project management methodologies has a significant effect on the success of software development projects.

In order to determine the effect of utilization of agile project management methodologies on continuous development, regression analysis was conducted. The results are summarized in Table 4.

Table 3: Single regression analysis results showing the effect of agile technologies on continuous development

R square=0.437, P=0.000		
	Standardized Coefficients	Sig.
	Beta	
Agile project management methodologies	0.462	0.000

Source: Primary Data

The R^2 results of the regression analysis in Table 3 above indicate that the variance in continuous development explained by utilization of agile project management methodologies is 43.7%. This means that utilization of agile project management methodologies enhances continuous software development. The results show that utilizing agile project management methodologies is significantly related with continuous development where the beta coefficient (β) = 0.462 and the p value of 0.000 is less than the chosen alpha (α) level of 0.05.This means that utilizing agile project management methodologies has a significant effect on the success of software development projects.

The effect of utilizing agile project management methodologies on timely delivery of software projects at Flock of Birds, Uganda

The second objective of the study was to assess the effect of the utilization of agile project management methodologies on the early delivery of software products at Flock of Birds. To achieve this objective, the respondents were asked to respond to a number of statements regarding the effects of agile project management methodologies on the early delivery of software projects at Flock of Birds. This objective was analysed by using descriptive statistics namely the mean and the standard deviation. The mean portrays the average response on a statement and standard deviation portrays the extent to which scores deviate from the mean. The interpretation scale was; 1.00 – 1.80 (strongly disagree), 1.81 – 2.60 (disagree), 2.61 – 3.40 (moderately agree), 3.41 – 4.20 (agree) and 4.21 - 5.00 (strongly agree). The results are summarized in Table 4.

Table 4: Responses on early delivery

Item	Mean	Standard Deviation	Interpretation
Early delivery has been improved with adoption of agile project management	4.60	0.83	Strongly Agree
The adoption of agile project management promotes timely delivery of software projects	4.34	0.53	Strongly Agree
The adoption of agile project management promotes customer satisfaction with the timeliness of project deliverables	4.21	0.69	Strongly Agree
Adopting agile project management methodologies ensures that software development projects are within schedule	3.89	0.83	Agree
Aggregate Mean	3.60	0.80	High

Source: Primary Data

According to the results in Table 4, the study respondents strongly agreed that utilization of agile project management methodologies improves early delivery of software products (Mean= 4.60, SD= 0.83).
The study respondents also noted that the adoption of agile project management promotes timely delivery of software projects (Mean= 4.43, SD= 0.53). This means that utilization of agile project management methodologies promotes timely delivery of software products (Beck et al., 2001a).
According to the study respondents, the adoption of agile project management promotes customer satisfaction with the timeliness of project deliverables (Mean= 4.21, SD= 0.69). This means that utilization of agile project management methodologies enhances customer satisfaction with the timeliness of project deliverables. This was reinforced by a key informant who noted that:

> *…I am beginning to like what agile project management can achieve the few times I have employed it.* (Key Informant Interview).

It was also noted by the study respondents that adopting agile project management methodologies ensures that software development projects are within schedule (Mean= 3.89, SD= 0.83). This means that utilizing agile project management methodologies ensures that software development projects are on schedule.

Hypothesis Two: Utilization of agile project management methodologies has a significant effect on early delivery of software projects

In order to determine the effect of using agile project management methodologies on the early delivery of software development projects, correlation and regression analysis were conducted. The results are summarized in Table 5.

Table 5: Correlation results for agile project management and early delivery of software development projects

		Early Delivery	Agile Project Management
Agile Project Management	Pearson Correlation	1	0.322**
	Sig. (2-tailed)		.000
	N	110	110
Early Delivery	Pearson Correlation	.322**	1
	Sig. (2-tailed)	.000	
	N	110	110
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary Data

According to the results in Table 5, utilizing agile project management methodologies and early delivery of software development projects were found to have a significant positive relationship where the correlation coefficient (r) = 0.322 and the p value of 0.000 is less than the chosen alpha (α) level of 0.05. Hence, hypothesis two is accepted. This means that utilizing agile project management methodologies has a significant effect on the early delivery of software development projects at Flock of Birds.

In order to determine the effect of utilizing agile project management methodologies on early delivery of software development projects, regression analysis was conducted. The results are summarized in Table 6.

Table 6: Single regression analysis results showing the effect of utilizing agile methodologies on the success of software development projects.

R square=0.103, P=0.000		
	Standardized Coefficients	Sig.
	Beta	
Agile project management methodologies	0.322	0.000

Source: Primary Data

The R^2 results of the regression analysis in Table 6 above indicate that the variance in early development explained by utilization of agile project management methodologies is 10.3%. This means that utilization of agile project management methodologies promotes early delivery of software development products (Beck *et al.*, 2001a).

The results show that utilizing agile project management methodologies is significantly related with early delivery of software projects where the beta coefficient (β) = 0.322 and the p value of 0.000 is less than the chosen alpha (α) level of 0.05. This means that utilizing agile project management methodologies has a significant effect on the early delivery of software development projects.

The effect of utilizing agile project management methodologies on team work at Flock of Birds, Uganda
The third objective of the study was to assess the effect of the utilization of agile project management methodologies on teamwork at Flock of Birds. To achieve this objective, the respondents were asked to respond to a number of statements regarding the effects of agile project management methodologies on teamwork at Flock of Birds. This objective was analysed by using descriptive statistics namely the mean and the standard deviation. The mean portrays the average response on a statement and standard deviation portrays the extent to which scores deviate from the mean. The interpretation scale was; 1.00 – 1.80 (strongly disagree), 1.81 – 2.60 (disagree), 2.61 – 3.40 (moderately agree), 3.41 – 4.20 (agree) and 4.21 - 5.00 (strongly agree). The results are summarized in Table 7.

Table 7: Responses on Teamwork

Item	Mean	Standard Deviation	Interpretation
Utilizing agile project management methodologies promotes team work among software developers	4.52	1.01	Strongly Agree
Utilizing agile project management methodologies promotes collaboration among software developers	4.42	1.10	Strongly Agree
Utilizing agile project management methodologies promotes cooperation among software developers	3.80	1.04	Agree
Utilizing agile project management methodologies reduces un-necessary competition among software developers	3.64	1.31	Agree

Source: Primary Data

According to the findings in Table 8, the study respondents noted that utilizing agile project management methodologies promotes teamwork among software developers (Mean= 4.52, SD= 1.01). This suggests that utilizing agile project management promotes team work among software developers at Flock of Birds. The study respondents noted that utilizing agile project management methodologies promotes collaboration among software developers (Mean= 4.42, SD= 1.10). This means that agile project management methodologies promote collaboration among software developers at Flock of Birds.

According to the respondents to the study, utilizing agile project management methodologies promotes cooperation among software developers (Mean= 3.80, SD= 1.04). This means that utilization of agile project management methodologies promotes cooperation among software developers at Flock of Birds. The study respondents indicated that utilizing agile project management methodologies reduces unnecessary competition among software developers (Mean= 3.64, SD= 1.31). This means that utilization of agile project management methodologies reduces un-necessary competition among software developers at Flock of Birds.

Hypothesis Three: Utilization of agile project management methodologies has a significant effect on teamwork

In order to determine the effect of using agile project management methodologies on teamwork during the development of software projects, correlation and regression analysis were conducted. The results are summarized in Table 8.

Table 8: Correlation analysis results showing the relationship between utilization of agile project management methodologies and teamwork

		Agile project management methodologies	Teamwork
Agile project management methodologies	Pearson Correlation	1	.524**
	Sig. (2-tailed)		.000
	N	110	110
Teamwork	Pearson Correlation	.524**	1
	Sig. (2-tailed)	.000	
	N	110	110
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary Data

According to the results in Table 8, utilizing agile project management methodologies and teamwork during software development projects were found to have a significant positive relationship, where the correlation coefficient (r) = 0.524 and the p value of 0.000 is less than the chosen alpha (α) level of 0.05. Hence, hypothesis three is accepted. This means that utilizing agile project management methodologies has a significant effect on teamwork during software development projects at Flock of Birds.

In order to determine the effect of utilizing agile project management methodologies on teamwork during software development projects, regression analysis was conducted. The results are summarized in Table 9.

Table 9: Single regression analysis showing the effect of utilizing agile project management methodologies on teamwork

R square=0.325, P=0.000		
	Standardized Coefficients	Sig.
	Beta	
Agile project management methodologies	0.524	0.000

Source: Primary Data

The R2 results of the regression analysis in Table 9 above indicate that the variance in teamwork explained by utilization of agile project management methodologies is 32.5%. This means that utilization of agile project management methodologies promotes teamwork among software developers.

The results show that utilizing agile project management methodologies is significantly related with teamwork during the development of software where the beta coefficient (β) = 0.322 and the p value of 0.000 is less than the chosen alpha (α) level of 0.05. This means that utilizing agile project management methodologies has a significant effect on teamwork. This practically implies that utilization of agile project management methodologies enhances teamwork among software developers.

Summary of Findings

The effect of utilizing agile project management methodologies on continuous development of software products

The first objective of this study was to assess the effect of utilizing agile project management methodologies on continuous development of software products at Flock of Birds, Uganda. The study found that using agile project management in software development enhances continuous integration.

The effect of utilizing agile project management methodologies on timely delivery of software projects

The second objective of the study was to assess the effect of the utilization of agile project management methodologies on the early delivery of software products at Flock of Birds. The study found out that utilization of agile project management methodologies improves early delivery of software products.

The effect of utilizing agile project management methodologies on team work

The third objective of the study was to assess the effect of the utilization of agile project management methodologies on team work at Flock of Birds. The study found that utilizing agile project management methodologies promotes team work among software developers.

Discussion of Findings

The effect of utilizing agile project management methodologies on continuous development of software products

Utilization of agile project management methodologies was found to have a significant positive effect on continuous development of software projects at Flock of Birds. This means that utilizing agile project management methodologies enhances continuous development of software projects. This is because in contrast with traditional project methods, agile methods emphasize the incremental delivery of working products or prototypes for client evaluation and optimization.

While so-called "*predictive*" project management methods assume that the entire set of requirements and activities can be forecast at the beginning of the project, agile methods combine all the elements of product development, such as requirements, analysis, design, development and testing — in brief, regular iterations. Each iteration delivers a working product or prototype, and the response to that product or prototype serves as crucial input into the succeeding iterations.

Delivering "*customer value*" is a key aspect of agile project delivery. Agile project management is conducted through the collaboration of a small, co-located team that usually consists of the customer/end user, a project manager, a business analyst (or the role of business analysis) and specialist(s).

> *"Agile theory assumes that changes, improvements and additional features will be incorporated throughout the product development life cycle, and that change, rather than perceived as a failing of the process, is seen as an opportunity to improve the product and make it more fit for its use and business purpose" (*Nee, 2010).

The study found that using agile project management methodologies enhances continuous integration. Continuous integration refers specifically to the process of steadily adding new code commits to source code, a concept that has evolved over the years. Originally, a daily build was the standard for continuous integration. Today, the usual rule is for each team member to submit work as soon as it is finished and for a build to be conducted with each significant change. Usually, a certain baseline of automated unit and integration testing is performed to ensure that new code does not break the build. This way developers know as soon as they're done if their code will meet minimum standards and they can fix problems while the code is still fresh in their minds. An important advantage of continuous integration using agile project management methodologies is that it provides developers with immediate feedback and status updates for the software they are working on as observed by TechTarget (2014).

The study found that using agile project management methodologies enhances continuous integration. Continuous delivery builds on continuous integration and as with continuous integration; each code commit is automatically tested at the time it is added. In addition to the automated unit and integration testing, a continuous delivery system will include functional tests, regression tests and possibly other tests, such as pre-generated acceptance tests. After passing the automated tests, the code changes are sent to a staging environment for deployment.

The study found that utilizing agile project management methodologies enhances continuous deployment. Continuous deployment adds more automation to the process to the software development process. After passing all the automated delivery tests, each code commit is deployed into production as soon as it is available. Because changes are delivered to end-users quickly and without human intervention, continuous deployment can be seen as risky. It requires a high degree of confidence both in the existing application infrastructure and in the development team. According to Tech Target (2014) continuous deployment is frequently observed in consumer-facing web and mobile applications that repeatedly pushes updates to their clientele as a part of the value that they bring.

The effect of utilizing agile project management methodologies on timely delivery of software projects

The study found that utilizing agile driven software development methods has a momentous positive impact on propitious delivery of software products. This is likely to increase customer satisfaction. This finding is in line with the research conducted by Buresh (2008) was used to assess whether the use and results agile-driven software development methodologies are as effective in satisfying customers as the use and results of plan-driven software development methodologies and found that the reason projects fail is because the customary answers of planning better, working harder, and becoming more customer driven actually exacerbate the problem. The whole purpose of plan driven project management techniques is to capture and satisfy customer needs at the beginning of a project. Thus, agile-driven methodologies may be better able to address the needs of the customers throughout a project, thereby ensuring its continued success. One of the major goals of agile-driven methods is the incorporation of customer input to ensure timely delivery of software products. One of the major goals of agile-driven methods is the incorporation of customer input to ensure timely delivery of software products as observed by Beck et al (2001). The focus is on satisfying the customer throughout the software development cycle. In contrast, in plan-driven software development methodologies, the customer reviews the progress of the software being developed either at pre-established milestones or at the end of the project as supported by Desaulniers, and Anderson (2001).

The effect of utilizing agile project management methodologies on team work

This study found that utilizing agile driven software development methods has a significant positive on teamwork. At the heart of agile methods is the key tenet that teams and teamwork are better than individual contributions and effort. According to The Agile Manifesto (2001), teams are required to develop new complex products and services and in a much faster way. The agile manifesto observes that all stakeholders involved in the project including and not limited to product owner, project manager, project coordinator, scrum master and developers must work together daily throughout the project. Projects should be built around motivated individuals, give them the environment and support they need, and trust them to get the job done. The best architectonics, prerequisite, and model emerge from self-organizing teams.

In an Agile team, the project manager must define the relationships between the roles to enable the effective coordination and control of the project. The following rules should be applied when defining organizational structures: Ensure that each member of the team reports to one and only one person (the "unity of command principle") and Ensure that each person has no more than seven people reporting directly to him or her (the "rule of seven" principle) (Fayol, 1917).

However, individuals with different personalities are often expected to work together as a cohesive team. Team efficiency is often dependent on the interaction between team members and the coordination of the team leader. According to studies conducted by Abilla (2006), team efficiency is at its peak when team size is or equal to 3 to 7 and it starts to decrease when team size goes beyond 9 members. Agile teams also work best in a common workspace or collocated locations. This approach expedites transmission and association and has demonstrated to be an effective means of increasing team productivity. In a software project, the objective is to deliver a project on time, to budget and within the agreed quality level. Therefore, software project managers have the responsibility for the success of projects. Managers should be skilled leaders and good at organizing problem-solving sessions that enable maximizing collaboration across departments and teams as observed by Johnson (2008).

Conclusion

The effect of utilizing agile project management methodologies on continuous development of software products

The study set out to assess the effect of utilizing agile project management methodologies on continuous development of software products at Flock of Birds, Uganda. The study found that utilizing agile project management methodologies has a significant positive effect on continuous development. Thus, it can be concluded that using agile-driven software development methodologies enhances continuous development of software which eventually translates into project prosperity.

The effect of utilizing agile project management methodologies on timely delivery of software projects

The study set out to examine the effect of utilizing agile project management methodologies on early delivery of software products at Flock of Birds, Uganda. The study found that utilizing agile project management methodologies has a significant positive effect on continuous early delivery of software projects. Thus, it can be concluded that using agile-driven software development methodologies enhances early delivery of software products which eventually translates into project prosperi5.4.3. The effect of

utilizing agile-driven project management methodologies on team work
The study set out to examine the effect of utilizing agile project management methodologies on teamwork at Flock of Birds, Uganda. The study found that utilizing agile project management methodologies has a significant positive effect on teamwork. Thus, it can be concluded that using agile driven software development methodologies enhances teamwork which eventually translates into project success.

Recommendations

The effect of utilizing agile project management methodologies on continuous development of software products
Since utilizing agile project management methodologies enhances continuous development, management at Flock of Birds should continue using agile-driven software methodologies in order to enhance software development project opulence.

The effect of utilizing agile project management methodologies on timely delivery of software projects
Since utilizing agile project management methodologies enhances early delivery of software projects, management at Flock of Birds should continue using agile-driven software methodologies in order to enhance software development project opulence.

The effect of utilizing agile driven project management methodologies on team work
Since utilizing agile project management methodologies enhances teamwork on software development projects, management at Flock of Birds should continue using agile-driven software methodologies in order to enhance teamwork as a way of improving software development project opulence.

Study Limitations
Although there remains much to be done, this study generates preliminary findings in the field of Agile Project Management in the Software Development world. In other words, having acknowledged the limitations of data processing, we can nevertheless confirm that there are some limitations in this study. Although the present study has yielded some preliminary findings, its design is not without flaws. A number of caveats need to be noted in regard to this study.

The most serious challenge was that of failure to obtain interview appointments from all the expected informants in the sample size. This resulted in collecting less data than would have been gathered if all the interviews had been performed. However, it occurred that data saturation covering the phenomena under exploration was quickly reached with the actual interviews held. The other limitation concerns the seemingly biased nature of informants who participated in the research. All interviews that were held with government officials showed a biased preference to express pre-determined ideas such as those included in governmental reports and legal documents even in areas that sought unique suggestions and personal opinions. The third limitation concerns the facets that influence the utilization of agile project management methodologies. There might be some other relevant factors which significantly influence agile project management utilization but in this study, they have not been scoped. It is not within the scope of this paper to provide an extended discussion of the on-going debates in the same regard. Factors affecting utilization of Agile Project Management Methodologies are still a tentative subject to

confirmation and modification through further investigation and examination. The question is one that will deserve empirical scrutiny.

Study Contribution

This study has made a contribution to literature regarding Agile Project Management in Uganda. Findings from this study will go long way in establishing a path of how better software development projects can be managed and better utilized than before. This will help develop better performance on deliverables and schedules for projects as a whole. This study should equally contribute to the Information Technology (IT) structures and policies so as to strike a balance between faster deliveries, cost effectiveness and team balancing. Institutions like Ministry of Information Communication and Technology, National Information Technology Authority (NITA) and Uganda Communication Commission (UCC) can take responsibility of making some content of this study be part of guiding principles of how IT firms should or would work. Other fields that are not Software related can find this study equally important because Agile Project Management can also be used in other fields other than Software industry, according to Gibbs (2006) the trailblazers of the agile methodology and other iterative software development approaches followed the example of Toyota's lean production, and their purpose was to literally eliminate much of the overhead experienced in waterfall-based lifecycles. Software development iterations lasted between two to four weeks then, and to date the duration has not changed much – Rothman (2007) reiterates that they last between one to four weeks. Finally, the research into the utilization of Agile Project management should be able to guide most of the firms to align their work processes, eliminate bottlenecks and seal the loopholes for better service, project or product delivery.

This study will contribute to the knowledge especially in the application of the Technology Acceptance Model, Technology Acceptance Model II and Complex-adaptive Information Systems Theory to explain embracing of agile project management in Ugandan context.

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