Introduction

Agile scrum practice in the information technology world has prospered especially in the product development life cycle. Many development groups have incorporated the agile technology with enthusiasm looking at it as the future of product development. It presented to designers, developers, product managers, product owners, and executives the no-nonsense approach of developing products from start to finish. Agile can take many forms where the most common of which are Kanban, extreme processing (XP), and scrum (Geyda and Lysenko, 2018). All these require the use of an integrated tool called planning. In almost all phases of agile product development, planning is required. In a sprint duration, planning is needed before it is to be implemented (Alhazmi and Huang, 2018). All members of the sprint team get together and start to detail out the needed tasks which they convert into stories that if implemented will ensure that by the end of the sprint, a viable product is produced by the team. This is then magnified into a release which agile defines as a collection of sprints decided by the release team management if a product is ready to be handed out to client users. Normally a sprint takes a duration of three weeks. A release can be composed of four sprints making it approximately a three-month period. What makes scrum/agile very appealing to executives is that it can cut the development time of a product from one year which is common to the waterfall development life cycle to just three months. The math is simple. A product done in three months is less costly than a product done in one year.

There are current researches conducted that questions but also try to answer what the exact benefits the scrum/agile gives to a development group (Serrador and Pinto, 2015). They did come up with a few answers on how the return of investment is statistically met but dug up other issues that because scrum implementation can be company dependent, many companies use hybrid implementation of agile to make it work more efficiently (Lopez-Martinez et al., 2016). Their researches underscored that more study is needed to examine the relationship whether agile works best just in dynamic environments where information technology is heavily used or works

well in all other non-IT environments (Alhazmi and Huang, 2018). More importantly, there is

little or no research that investigates why many companies use hybrid Agile methods (where a

mix of agile and traditional methods) are used to implement product development (Serrador and

Pinto, 2015). A survey performed by YouGov showed that the implementation of pure agile

tends to be more successful compared to hybridized projects (Francino, 2017). She added that

companies that used hybrid methodology became prominent because they experienced difficulty

with the transition from a pure waterfall to a pure agile approach. In recent years, the agile

hybrid approach has become popular within the government and public funded establishments.

These organizations are a stickler to the linear and classic sequential or traditional waterfall

approach. They have been using waterfall for almost all their existence and the longer the

organization has embraced waterfall, the harder for any agile professionals hired to train them to

use pure agile. Other factors that hinder these organizations to use pure agile are the handcuffs of

governance, the convoluted bureaucracy and the fears within the personnel affected of change

(Oluwole, 2015).

<div align="center">**Problem Statement**</div>

The problem to be addressed by this study is that many IT development groups have

implemented hybrid agile methodologies that resulted in decreased work performance by agile

professionals and lowered agile success metrics in the long run. A survey of the development and

IT professionals done by YouGov showed that pure agile projects are more successful than those

that combine agile and waterfall (hybrid) processes (Francino, 2017). Serrador and Pinto (2015)

mentioned that the software development companies who adopted a hybridized agile

methodology approach tend to tweak product planning approaches that their life cycle produces

varying project outcomes which generally slowed down the adaptation of the pure agile process

as a whole plus lengthened the product development life cycle as a whole. Francino further

added that as agile implementation generates a widespread adoption, those who select to use

hybrid processes eventually find that the two processes, waterfall and agile, conflict with each other. This problem of development teams applying the hybrid approach are noted by agile professionals assigned in these teams. These practices will need to be discouraged as the agile methodology can only become very efficient if it is purely applied. Many institutions do not want to implement pure agile because of the full cost of pure implementation and the fear of change. All agilest will say that the only way to take full advantage of agile is to go all the way. In addition, Schuh et al. (2017) in their report stated that there is limited documentation when it comes to more specific approaches like the use of a hybrid model where several teams within a waterfall environment work within the confines of the agile scrum approach. They added specifically that they did not find any quantitative data available. Thus, this research will fill this gap.

Purpose Statement

The purpose of this quantitative survey research will be to test the theory of management used by sprint teams that compare the effects of the presence or absence of hybrid agile models based on the product development time at a corporate IT development site. The independent variable is the presence of a hybrid model which will be defined as the agile process mixed with the traditional (waterfall) method used. The dependent variable will be the duration of product development. Another dependent variable will be the agile success metrics. This study will be achieved using a survey patterned after the quantitative survey used by Serrador and Pinto (2015) using a minimum of 97 recruited agile professionals of the Scrum Alliance group.

Research Questions

The following are the research questions to be answered:

Q1. To what extent does the duration of product development differ when a hybrid process is applied?

Null hypothesis: The absence of a hybrid methodology will increase the duration of the product development time.

Alternate hypothesis: The presence of a hybrid methodology will increase the duration of the product development time.

Q2. To what extent does the agile success metrics differ when a hybrid model is added, based on product development time?

Null hypothesis: The presence of hybrid methodology will not be different in terms of agile success metrics from a pure agile, based on product development time.

Alternate hypothesis: The presence of hybrid methodology will be different in terms of agile success metrics from a pure agile, based on product development time.
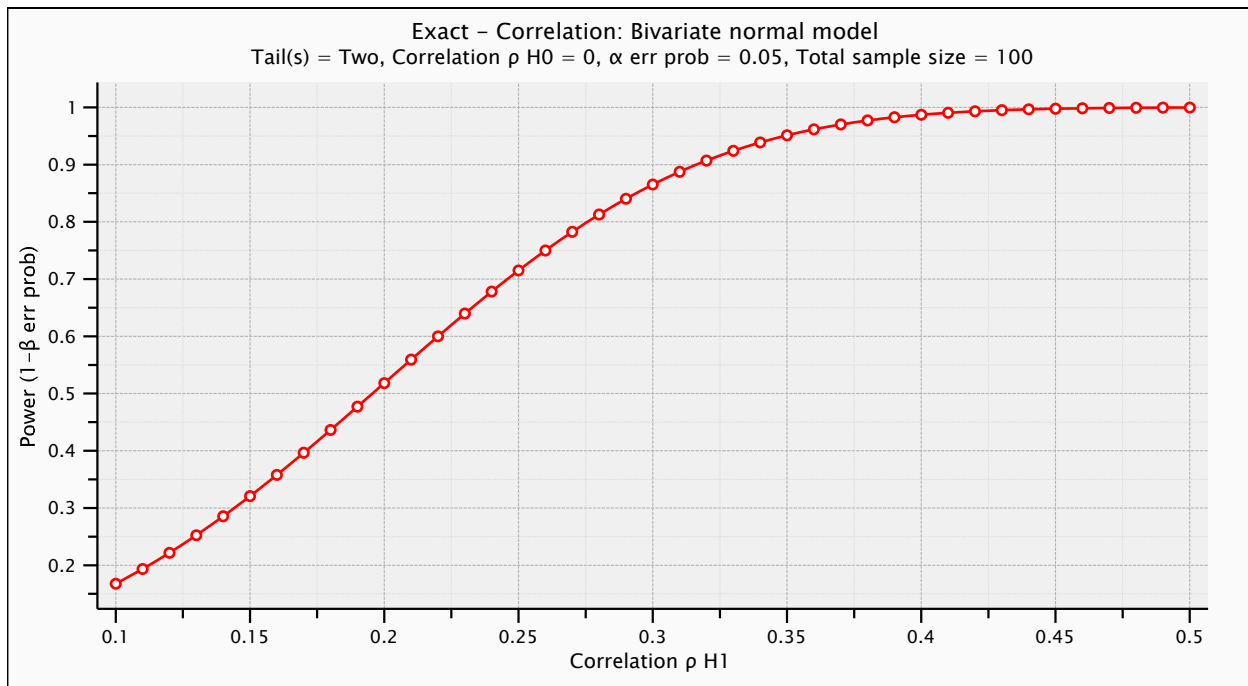
Methodology and Design

I plan to use a quantitative non-experimental survey to address my research questions. I will direct it to all registered Agile professionals of the Scrum Alliance group where I belong. I know that these professionals are mostly working on development groups many of whom are in government institutions. Data collection and analysis will be done by a service like Qualtrics. I also intend to use their service to help me recruit and schedule participants.

The advantage of using surveys to collect data in this study is that it is one of the better methods of collecting information for quantitative research. As long as due diligence is done when creating its design, to include specifying the purpose and identifying the most appropriate data collection method, the quality of data to be gathered will be high. Likewise, it is important to underscore that data quality is dependent on the response rate plus diligence in following up of non-respondents. On the other hand, the disadvantages of using surveys include having respondents not being totally honest about their answers. They can also be uncomfortable with their answers leading to the skewing of the data. Survey questions if not done right, can be

inflexible especially if it is the only method used to get data. Finally, biases can occur: under

coverage, the nonresponsive and voluntary response that can lead to errors.

        I intend to use simple random sampling to get participants. The population I want to get

my participants from are the certified agile professionals (scrum master and product owners) of

the Scrum Alliance organization where I belong. These professionals are very much affiliated

and employed by many development organizations that perform both pure and hybrid agile

methodologies. Each member will have an equal chance to be selected. I will assign a number to

every member of the Scrum Alliance group, using a table of random numbers, and use a

computer to randomly generate a list of numbers that will be assigned to become my participants.

According to Mertens (2014), the quantitative research rule of thumb using power formulas in

order to find a medium one-tailed and/or two-tailed statistically significant relationship or

difference with .80 power at the 5% level of significance is 100 observations for each major

group; 20 to 50 for minor subgroups. Performing a power analysis using G*Power3 to get a good

sample size, I envision to select at least 100 participants for me to be able to reliably explain a

coefficient correlation that is 90% of the variance at between 0.25 and 0.3 (see chart below). In

this regard, I will need to reach out to more than 100 participants. This will give me margin of

errors at 5% (80), 2.5% (94) and 1% (99).

Exact – Correlation: Bivariate normal model
Tail(s) = Two, Correlation ρ H0 = 0, α err prob = 0.05, Total sample size = 100

For the survey questions themselves, I plan to create the survey questions patterned on what Serrador and Pinto (2015) used that will contain many closed-ended questions such as multiple-choice questions. I believe that closed-ended questions will allow coding easier as the answers will allow me to be able to categorize data into groups based on explicit options selected. I will perform a pre-test or pilot survey before the final launch. That way I can use the pilot participants' answers as a guide to creating response options.

Data Collection & Analysis

My study follows an experimental method. It follows the postpositivist approach which requires the collection of data in the form of objective observations of related phenomena (Mertens, 2014). Using the experimental design approach, I will use the manipulation of independent variables to prove that my hypotheses are correct through the use of a quantitative non-experimental survey discussed above. It will require stringent internal validation to make sure that the results observed of the dependent variable I identified happen because of the effects on the independent variable. External validity will need to be carefully maintained against

explicit environmental conditions which require a reproducible independent variable, prevent

multiple treatment interference, avoid the Hawthorne effect, to name a few.

Reliability, Validity, Limitations, and Biases

According to Mortens (2014), the relationship between research and ethics is that each

research activity is an ethical exercise, each research question represents a moral problem, and

each resulting research decision is a manifestation of values. The distinction concerning research

methods and ethics appear to not exist. Ethical considerations should always be present in all

aspects of the data collection. It should not only take precedence when conducting sampling but

should be true in the planning, conduct, and analysis of the data collected. More precisely, the

aspects that contain the biggest ethical considerations are informed consent, how to collect

sensitive information, the consideration of confidentiality versus the disclosure of harm, mental

capacity act, and inclusivity.

I believe one limitation I will have is that I am not sure how huge the list of members the

Scrum Alliance have. Also, I am not sure how accessible they will be upon request. I will need to

perform due diligence when contacting the Scrum Alliance management and inquire what the

best approach or process is needed. Surveys may tend to be slow to design, implement then

analyze to include its accuracy may depend on how many are sampled. It could potentially have

a low response rate. I will need to make sure that the survey will be made to maximize the

generation of answers in this regard will require extensive pilot testing, iteration then eventual

implementation. I am also concerned about a possible sampling error. I may have an

oversampling of scrum masters than scrum product owners. I hope to generate a hundred

participants but may need to increase this population to be able to cover enough participants for

both scrum professional roles until the minimum 97 participants is achieved

The data analysis that I plan to do will require due diligence in the handling of the data I

gather. I will need to make sure that I follow non-responders up and that the data between

respondents and non-respondents are compared appropriately. I also plan to compare data

between data groups that come in: first wave, second wave, and third wave. I will look for

patterns on answers received, looking for extremes and trends. I will use tables and graphs to

tabulate data received for the purpose of creating clearer data analysis.

As for possible Type I and Type II errors, I know that they are to be avoided. If I claim

that there is a difference in the resulting variable condition identified but there was really none,

then I am committing a Type I error. However, Type I errors can be considered especially if the

Type I error is pre-established and it is termed alpha level (α). It can be 0.05 probability which

means that it is still statistically significant when there really is not. Type II errors occur if I

claim that there really was no real difference but in reality, there was then this is called Type II

error (or beta or b). If this is the case, the power of a statistical test can then be defined as 1 – b.

As I mentioned above, I plan for 100 participants. My margin of errors will be at 5% is 80, at

2.5% is 94, and at 1% it is 99. To have a significant result, my required sample size will have to

be 97 to respondents. So, what steps can I take ahead of time to help avoid issues related to Type

I & II errors as well as power? My answer would be to get a bigger sample size I can afford that

will need to be large enough to ensure that a significant difference will exist. The larger the

sample size, the smaller the error can be, and the more significant the data becomes.

While collecting information, I will need to be mindful to have my participants be

informed of their willingness and expressed consent to participate. Each participant will be

made aware of the type of information that will be gathered, an explanation of why the

information is needed and for what purpose, to include how it will directly or indirectly affect

them. Likewise depending upon budget, I might prepare a small token to give to participants who

successfully finish the survey.

Conclusion

This course provided a very good foundation to help me have successful completion of my dissertation. The course focused on the research methods to be used especially the qualitative, quantitative and mixed methods. I have come to familiarize myself with these critical research methodologies: how to create a problem statement followed by the purpose statement and research questions. I have come to realize how complicated the process of creating and researching for a research topic and that only through proper literature research and continued iterations can these be done. I learned to determine how best to gather data, the method to analyze them and also what the factors that contribute to data reliability, validity, ethics involved with participants, limitations, and biases that come when conducting research. And from the assignment feedback, I have gained the knowledge on what criteria requirements are needed to have a quality research project, how to make them as cohesive, and most of all aligning them starting from the problem statement, purpose statement, research questions and hypothesis, methodologies and data gathering tool, to analysis and eventually presentation. All in all, I am very grateful for this course and the knowledge take away is indeed very valuable.

References

Alhazmi, A. & Huang, S. (2018). A Decision Support System for Sprint Planning in Scrum

    Practice. (2018). *SoutheastCon 2018, SoutheastCon, 2018*, 1. https://doi-

    org.proxy1.ncu.edu/10.1109/SECON.2018.8479063

Francino, Y. Tech Bacon (2017, February 2). Why hybrid agile-waterfall projects fail. Retrieved

    from: https://techbeacon.com/app-dev-testing/why-hybrid-agile-waterfall-projects-fail

Geyda, A. & Lysenko, I. (2018). Information technologies efficiency models for agile systems

    functioning. Proceedings of the XXth Conference of Open Innovations Association

    FRUCT, Vol 426, Iss 22, Pp 313-319 (2018), (22), 313. Retrieved from

    http://proxy1.ncu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db

    =edsdoj&AN=edsdoj.99db5df70b5146feab988ed5f2f010a3&site=eds-live

Lopez-Martinez, J., Juarez-Ramirez, R., Huertas, C., Jimenez, S., & Guerra-Garcia, C. (2016).

    Problems in the adoption of agile-scrum methodologies: A systematic literature review.

    2016 4th international conference in software engineering research and innovation

    (conisoft), software engineering research and innovation (conisoft), 2016 4th

    international conference in, conisoft, 141. https://doi-

    org.proxy1.ncu.edu/10.1109/CONISOFT.2016.30

Oluwole,D (2015, May 21). Hybrid agile versus agile. Retrieved from:

    https://www.scrumalliance.org/community/articles/2015/may/hybrid-agile-versus-agile

Mertens, D. M. (2014). *Research and evaluation in education and psychology: integrating

    diversity with quantitative, qualitative, and mixed methods*. Sage. Retrieved from

    http://proxy1.ncu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db

    =edsbvb&AN=EDSBVB.BV035726466&site=eds-live

Serrador, P., & Pinto, J. K. (2015). Does Agile work? - A quantitative analysis of agile project

success. *International Journal of Project Management*, *33*, 1040–1051. https://doi-

org.proxy1.ncu.edu/10.1016/j.ijproman.2015.01.006