

Adoption and Implementation of DevOps by the Software Companies of Bhutan

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Abstract: Due to the increase in the use of information system in daily activities of individuals, the necessity and demand for such system has been continuously growing for the last few decades. Now, the time has come where such systems are readily available for one to use it. However, the quality of services and other software related issues must be solved within the short duration by the software developers or operators, otherwise the clients can choose the better option rather than the services of the former. Given that, the process and methods being applied during the software life cycle plays an important role in effectively delivering the services to the clients. The software company has to wisely choose the technology and methodology for their project so that their product can attract the current market as well as solve the trending problems. The research presents the finding and results of DevOps implementation across the software company of Bhutan that addresses the loophole of the conventional methods of software development life cycle.

Keywords: DevOps, Software, Development, Operations, Collaboration, Rapid Delivery.

I. INTRODUCTION

Given the growth and advancement in the use of technology [1, 2, 3], the use of digital system in various sector of Bhutan were seen to have increased dramatically [2, 4, 5]. Further, the outbreak of COVID-19 [6] in the country has helped the citizens to forcefully make use of digital platform and this has let them to understand the benefits and opportunities of using it [6, 7]. Those users got to reap the benefits due to the fact that the software developers have made it available for the users to be use it. In this regard, the software developers or software company has to choose the relevant technology and standards that enable them to get required output which is current and applicable to the changing times [8, 9]. The various platforms and tools are available for the software developers to adopt and apply in their projects [9]. However, with the change in time and depending on the one's requirements, one is required to choose the specific standards or platform to fulfill the set goals and objectives [8, 9]. This is because the specific platforms can be applied only in specified area of specialization though there are some which can be used in general [8]. In recent years, the techniques and methods used in Software Development are being transformed to accomplish better output of project by improving the collaboration between the software developers and the operators [8, 10]. DevOps is the combination of development and operations that work together to rapidly deliver the product without compromising the quality of the software [11]. Moreover, it involves in providing constant and timely services to its clients and customers related to their product [11]. The very paradigm has brought a lot of opportunities as well as challenges for the enterprise to grow and adapt with the new trends [8]. Using both the tools and practices which is mainly designed to enhance the company's capability to offer the services, the DevOps can efficiently provide better services related to the applications than the conventional software development processes [10]. In a process, DevOps are doing away with the complicated and inflexible teams who does works at their own level [1, 10, 8]. The main idea of very concepts is to enhance the collaboration between the software development team and the operations [1, 8, 10] so that everyone knows what is happening and any new changes can be easily incorporated having understood the reality at all level.

II. PROBLEM STATEMENTS

The methods and practices adapted during the software development life cycle plays an important role for the software to be stable and reliable [12]. The popular and most common practices followed in software company and organization is that they separate between software development and system operations [13]. This however makes the life cycle of product lengthier and create communication gap between the teams [13, 1]. Those software models are categorized into traditional and agile methods which can be further divided into specific model such as waterfall, iterative, spiral and many more [14]. However, those models had some downside which has led to the evolvement of new model to solve the issues being faced [12, 15]. In particular, agile methodology was evolved to enhance the sharing of information being shared among the project team members [12, 14]. Though the agile methodology has heightened the collaboration and communication between the project team and also minimized the development life cycle [12, 1], the DevOps were

evolved as the extension of agile [14] to further solve the issues being faced by the software company and the clients [10].

III. METHODOLOGY

The researchers have firstly done the literature review in order to understand the importance and relevancy of the research. In doing so, the platform such as Google Scholar and ResearchGate were used as the main source besides the other sources to get the related articles and papers. The conclusions, discussions and assumptions made by the respective authors were properly analysed to be reflected in the paper. This has mainly helped the researchers get the general ideas of the topics that is being implementing across the globe.

Having not satisfied with that, the researchers have adopted telephonic interview as well as collected the data through the use of questionnaire from the selected employee of the software companies across the country, Bhutan. The questionnaire comprises of mostly Likert scale and “Yes / No” questions but mostly of short answer type and few open-ended questions were used for the interview from which some were adopted from [11]. The data collected were checked and verified to remove the irrelevant information, thereby the analysis which were given in the subsequent section was done.

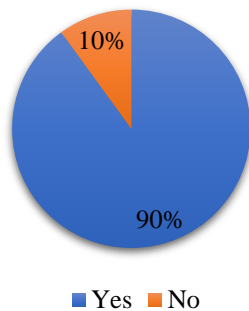
IV. RESULTS AND DISCUSSION

The following shows the analysis of data collected using the aforementioned methods.

A. Questionnaire Response

From the selected employee of the software companies in Bhutan, almost all the respondents were aware of the emerging methodology. However, most of the companies were not fully adopting and implementing it as shown in the Figure 2.

Awareness of DevOps



Implementation

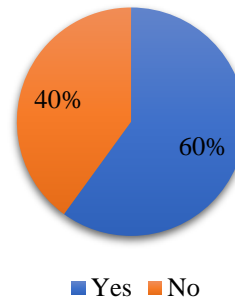


Figure 1: Awareness of DevOps by the Employee Figure 2: Full adoption and Implementations of DevOps

From the Figure 3, it conveys that the there are various challenges if one is to implement it in the software project.

Challenges

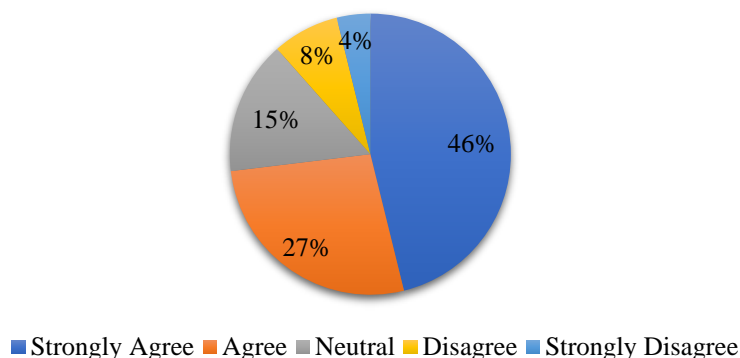


Figure 3: Challenges in implementing the DevOps

Though challenges are inevitable for the implementation of DevOps, it is reassuring to one after seeing the representation as shown in figure 4, as it provides more benefits than the conventional methods if it can be fully implemented in the software projects.

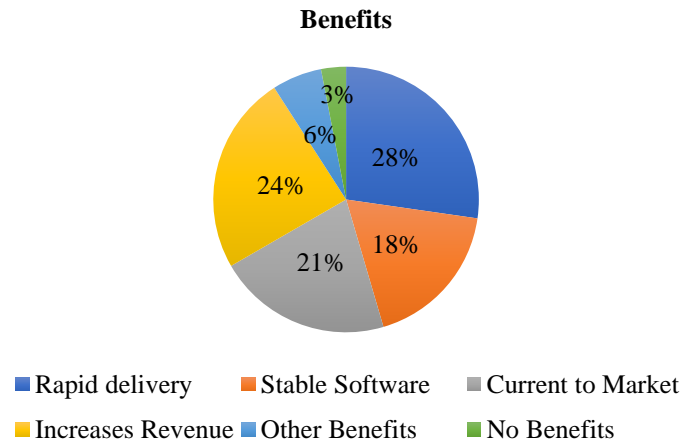


Figure 4: Benefits of its Implementation

For the question, “Do you recommend the implementation of DevOps in the Software Project?”, almost all of the respondents wanted and encourages the inclusion of it after experiencing more benefits than the its drawbacks.

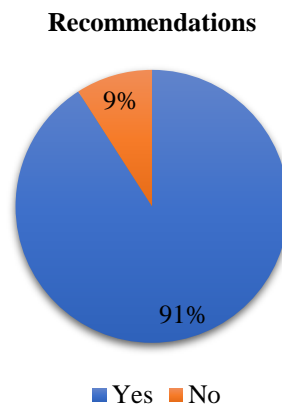


Figure 5: Recommendation for the Implementation of DevOps in Software Development Project

B. Interview Responses

The varied questions were asked to the respondents related to the implementation of DevOps in the Software Development Life Cycle. The responses were given based on the experiences and knowledge they have got through the use of such platform. Most of the respondents shared the drawbacks of conventional method such as longer software delivery time, ineffectiveness in providing the customer services, widening of communication gap between the departments of the company and incurring lost due to the loss of customer or clients as they are not satisfied with the services being offered. However, few of them still doesn't want to switch to DevOps as it requires one to invest their time and resources to adopt with the new trend. In fact, one must stay current with the latest technology as and when it evolves because DevOps work closely with the current technology to achieve its benefits.

Despite the challenges, most of the respondents recommend and encourages one to learn and implement it because they have felt it is worth investing time and resources to achieve the better results. This is due to the fact that the companies which has adopted in the country as well as in other countries were phenomenally benefited by its implementations.

If one is adapted and accustomed with what they have been doing in their day-to-day activities, learning new things and incorporating those in old habits would definitely be cumbersome in first few tries. However, one will get use to and even become experts after few more attempts. Because of this, one shouldn't lose hope and get discouraged just because

it is very challenging and takes time to understand about it. This is because, it will be habituated and one will be able to easily adopt and use it in the long run.

V. LIMITATIONS AND RECOMMENDATION

The analysis depicted in the research were mainly collected from the selected employees and therefore, the generalization being done during the representations may be inaccurate. Moreover, since almost all of the companies were based in Thimphu, capital city of Bhutan where the facilities are comparatively much better than in other districts, the data collections were targeted mainly to that area and therefore, there is possibility that the data collected from the companies based in other districts might result in different analysis.

VI. CONCLUSION

The research is mainly done to find out if DevOps methods were being implemented by the software companies of Bhutan. In doing so, the researchers have collected data by using interview and questionnaire methods from the selected employee who works for the software companies based in Bhutan. From the analysis shown in the previous section, it is evident that the concepts were being implemented in 60% of the software companies operating in Bhutan and it seems other companies are still adopting other means of methods to deliver the services to their clients. Going by the graphical representation, even the Bhutanese software developers seemed to have gained a lot of benefits like in other countries around the globe while incorporating the trending platform in software development life cycle. It was also understood from the research that the implementation of very method is not a piece of cake and it requires consistent dedication and hard work of oneself as well as the resources to make it a reality in software development life cycle.

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