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ORGANISATIONAL LEADERSHIP CHALLENGES IN ADOPTING DEVOPS IN NORTHERN NIGERIA SMES

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Abstract:

The development and operation issue is rapidly expanding as some organisations in northern Nigeria seek to capitalise on the benefits it can provide to software development organisations and information technology projects. Adopting DevOps, on the other hand, requires significant organisational change, especially where tradition and established processes exist. This study presents the findings of a five-month qualitative diary study following the implementation of DevOps in a Nigerian SME with over 100 employees as part of a large-scale doctoral research project that investigates software development processes and leadership challenges. Based on the study's findings, the case study organisation employs the DevOps approach to develop new software for internal and external use. DevOps appears to be well-known in theory, but it is extremely difficult to put into practise. This difficulty is exacerbated by the need to maintain old systems, a lack of technical leadership, management systems, and resilience. This research also found evidence of job creation, particularly among software developers. Taken together, we argue that DevOps is an interdisciplinary topic that requires all stakeholders to participate in order to communicate and collaborate, and that it would benefit greatly from more leadership and possibly deeper psychological research.

Keywords:

DevOps, Challenges, Adoption Benefits, Leadership, Composition, SME, Software Development, IT Operation

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Introduction

The DevOps software development strategy typically focuses solely on software development teams, IT managers, and quality assurance (Perez-Sanchez et al., 2022). The software is typically handed over to the IT operations team, who are responsible for its deployment, ongoing maintenance, and support, once it has been developed. This silo system can lead to organizational problems such as a blame culture between the two organisations communication issues (Raffo et al., 2019; Santos et al., 2020). However, in a similar vain, communication issues (Maroukian & R. Gulliver, 2020) and delays in providing software updates (Kenner III, 2019; Mayner & Daniels, 2017). However, only DevOps' primary stakeholders are suitable for communication and collaboration during software development (Bierwolf et al., 2017; Nisha & Khandebharad, 2022; Shichtman, 2018).

To address this issue, organisations are increasingly forming software development and IT operations teams. This integration is essential for the DevOps methodology, which emphasises a collaborative culture through the development of collaborative software and IT services (Maroukian & Gulliver, 2020; Nisha & Khandebharad, 2022). This type of integration aims to easily and quickly incorporate new code and features into software products and business information tools (Ampatzoglou et al., 2019; Maroukian & R. Gulliver, 2020).

Beginning in July 2022, we conducted a diary and interview study in a Nigerian organisation to compare two Nigerian organisations that use DevOps. Case studies and key findings from a systematic review of the expanding DevOps literature will be analysed and compared. The primary objective of this investigation is to identify management and social challenges as well as best practises. Proposed actions are the physical and cognitive modifications that individuals make when defining the boundaries of their actions (Azad & Hyrynsalmi, 2021; Mayner & Daniels, 2017). Consequently, these roles are essential to the employee-employer relationship, and job creation requires the establishment of physical, cognitive, and relational work boundaries (Maroukian & Gulliver, 2020).

There are three types of work creativity: task, relational, and cognitive (Maroukian & Gulliver, 2020; Nisha & Khandebharad, 2022). Task creation is a type of work creation in which work is completed rapidly and the definition of work can shift so that the worker becomes a supervisor or a driver. Employees who view their work as an integral component of a greater whole are more likely to employ a relational work model (Onefile, 2014; Shahzad et al., 2023). In conclusion, cognitive work innovation is the process by which employees alter their perspective on work so that they are no longer solely focused on producing high-quality results (Shahzad et al., 2023). Over the years, employee engagement has received considerable attention. We wish to gain a deeper understanding of the social and cognitive aspects of DevOps adoption at our case study organisation. We intend to extend the preliminary research presented in this paper by conducting additional action theory-based studies.

This research aims to clarify how the organisation and leadership structure influence DevOps support in the delivery of quality software systems, and vice versa, and to present the findings of a study that examines the adoption of DevOps in a small to medium-sized software development organisation with 50 to 100 employees in Nigeria, and what this means in terms of business leadership. Numerous case studies of DevOps tools and methodologies have been published in recent years. The influence of technical and social debt on export growth has been examined (Azad & Hyrynsalmi, 2021; Maroukian & R. Gulliver, 2020). Our activity, on the

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other hand, is unique in that it not only addresses continuous deployment, but also various leadership and business issues associated with the adoption of DevOps.

Methodology

We conducted a qualitative diary study with software development and IT operations teams to better comprehend DevOps adoption within the organisation. These studies began at the beginning of July 2022 and lasted for six months. Diary analysis and organisational software development projects use the same tools. Particularly Bitbucket and Git log are used to upload weekly Markdown log entries. The repository is protected and can be used to collect and monitor data of high quality. Each participant is given a list of questions to consider and their diaries are opened.

We completed a diary study with Sayagh et al., (2020) designed questions at the beginning, middle, and end of the research period. The purpose of the interviews was to glean additional information from the diaries (Hosio, 2019). In addition, participant recruitment is an ongoing concern for this type of longitudinal study, and questionnaires are a useful way to observe diary entries and collect data when necessary. Figure 1 illustrates the process.

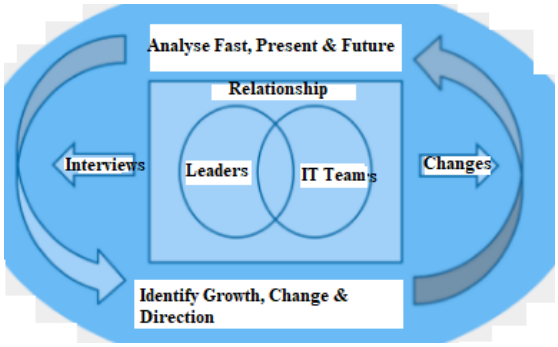

Figure 1 Diary Study and Interviews Process.

We use diary entries and interviews to analyse data. By comparing what has previously been described in the literature, we attempt to identify new practises and trends. Finally, we interpret the data to reach a conclusion.

Results

The findings are based on questions and 23 diary entries collected over the course of five (5) months. As a result, we organise the findings according to the data, with a focus on the organization's DevOps adoption.

Adoption of DevOps

The acceptance of the organization's DevOps system is contingent upon the software manager's awareness of the new structure and the organization's objectives. The software development manager stated in his interview that he is responsible for bringing the new system online, despite the senior security officials' lack of interest in the actual methods employed. Nonetheless, the team is concerned that the new system will be effective, simple to maintain, and capable of deploying new features and updates rapidly. Such goals are shared by the software development manager, who works to enhance the development process for the new system.

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Due to their importance to the organization's operations, the operating system and the development of new systems must occur simultaneously. Consequently, time must be allocated for both legacy system maintenance and new system development. According to the input draught, no member of the software development team wants to deal with legacy systems due to their generally poor quality, highly integrated nature, and lack of documentation. Although the current bed structure is adequate despite obvious sustainability concerns, the house's original developer described the previous structure as "somewhat" and not a drain.Unfortunately, the current system's dependence on obsolete technology can impede the development of new systems by requiring developers to "shift" between technologies. Existing systems will be unavailable for several hours as a result of the lengthy manual process required for implementation, causing disruptions for the organisation. When the deployment of an existing system fails, the deployment time skyrockets.

The leaders of the software development unit envision a DevOps process in which software developers and IT managers collaborate as a single team. Managers believe that the team will benefit greatly from continuous deployment of the system because new system updates can be rapidly tested and pushed to release versions while maintaining a high level of quality. service (QoS), such as avoiding problems when increasing the usage rate and frequency of new features and enhancements. Despite claims in the literature that DevOps and traditional development methods are incompatible, software development managers are convinced that such a process is based on Scrum, which is used for new development processes (Maroukian & Gulliver, 2020; Maroukian & R. Gulliver, 2020).

It is more difficult to adopt DevOps for new systems because software developers and IT managers must learn new technologies, tools, and methods. This is in addition to the continuous development process. On the developer side, it is not difficult to learn and acquire new skills. All developers stated in the initial interview that learning new technologies and methods was an essential and enjoyable aspect of their jobs. In contrast, the challenge focuses on the psychological factors that "change" or "disrupt" the new continuous learning process while the legacy system remains in place. Some developers have described this difficulty as "one of the most difficult issues they've ever faced," citing the need to switch between existing and new systems because they wear different hats. A clear preference for working on new systems, with developers expressing concern for the existing system base's quality. "Changes cannot be made when working with an existing system. There is no need for additional changes because removing something is equivalent. Everything is in order because he pulled the strings."

Leadership Structure, Composition, and Rigidity

According to the findings of this study, software development team managers are increasing the team's use of DevOps strategies for new systems. Even though the system is being developed intelligently, this work is being slowed down by a lack of business analysis. The software development manager is concerned about the organization's critical skill gap, yet he is compelled to perform this work despite the fact that he requires the organisation to hire a replacement. As a result, the quality of the DevOps process is compromised, and software managers are unable to support DevOps-related changes and individual employees in software development and IT operations.

According to previous research, the IT Operations team of the organisation consisted of two system administrators who were both proficient in the Microsoft environment. Another

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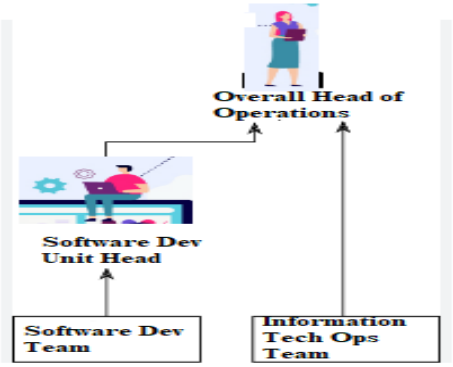
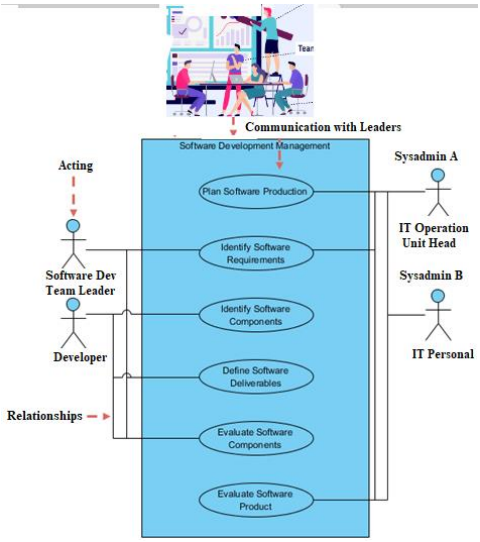
(Sysadmin A) is just beginning their career, while another (Sysad-min B) is well into their career; despite their age, Sysadmin A respects both of them. Because DevOps appears to be a national process led by the head of the software development department, the benefits of DevOps are viewed with scepticism by senior management. Additionally, there appears to be opposition from IT services, who believe their jobs are unrelated to those of software developers.

The management structure (see Figure 2) further complicates matters, as both the IT operations team and the head of the software development department report to the chief operating officer.



The Current Leadership Structure for Software Development and IT Operations.



Proposed Leadership Structure for Software Development and IT Operations within The Organisation

The overall leadership style facilitates dealing with frequent IT service resistance-related disruptions. Without first contacting the software development manager, a system administrator, for instance, describes Azure's cost savings. As stated in the diary, this type of disruption also affects software developers, as increased frustration and the realisation that the development team is responsible for everything demonstrate. Given the traditional management structure of the organisation, these "various IT operations" must be protected. This observation indicates that for the DevOps process to be successful within an organisation, both the IT operations and software development teams must report as depicted in Figure 3:

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Organisational management system recommendation for software development and IT operations.

Similarly important is Sysadmin B's career-long accumulation of knowledge. Despite his enthusiasm, Sysadmin A considers himself a "student," whereas Sysadmin B considers himself a "organisational system administrator" due to his knowledge. This sense of seniority and expertise appeared to rub off on CEO Jobs, who admitted he lacked the required abilities.

These results are context-dependent and may not be applicable to other organisations, particularly when leadership systems, employee attitudes, and technology systems vary.

The Social Sensation of DevOps

The group's research indicates that DevOps is a social and cultural phenomenon. According to their initial interviews, both system administrators believed their roles were limited to supporting end users and maintaining hardware. During the interview, Sysadmin A expressed a desire to acquire additional technical skills, specifically programming languages, the command line, and git. In fact, the head of software development organised additional training in Microsoft PowerShell and git for IT Services, which Sysadmin A attended. In conjunction with the available diary entries, this could be interpreted as a management strategy to utilise Sysadmin A's enthusiasm and drive to convince IT services to become more involved in Azure PowerShell projects and new deployment processes.

There is a risk of IT Service silos forming because all system administrators appear to have different work objectives and beliefs regarding what their work entails. Sysadmin B, on the other hand, believes that the developer is responsible for command line usage because it requires coding. "Consequently, he is acting beyond his responsibilities. According to the installation log, Sysadmin B believes his role as IT Services is limited to answering end-user questions about the software we are developing and supporting the equipment used in it. Development is responsible for configuring virtual machines and any other web servers or databases.

In the meantime, preliminary interviews and journal entries revealed that the case study group separated software development and IT tasks. In contrast, organisational silos can cause significant problems. Despite the fact that DevOps seeks to align both activities and, as a result, break down these silos, our case study team found DevOps implementation challenging, particularly given the observed management structure and resilience of IT Services.

Discussion

The structure of a software development team and an IT operations team is influenced by a number of variables. These factors include the type and complexity of the software product, the time necessary to deliver the product, the allotted budget, and the expertise's prior experiences. A software development team typically consists of a business analyst, a product owner, a project manager, a product designer, a software architect, software developers, software testing engineers, including test automation engineers, and a DevOps engineer. To assemble the ideal teams, we examine the prerequisites and determine team size, choose the team structure that best suits the project, and ensure that all software development team roles and IT operations team roles are filled. Deploy project management software to streamline

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daily operations, increase the transparency of project processes, and foster productive communication for the rapid deployment and delivery of software.

Conclusion

In this paper, we present the preliminary findings of an in-depth diary study of DevOps adoption in Nigerian SMEs. DevOps, we conclude, is a highly interdisciplinary topic. The organization's leadership structure must be addressed, as IT Services' resistance is now affecting the software development management process. The need to maintain legacy systems is one of the quality issues that developers face. Furthermore, this prevents learning new skills associated with the new system, which may present quality issues with the new system's foundation. Despite the fact that our research is still in its early stages, it has yielded interesting insights and insights into software development. Moreover, we genuinely believe that DevOps has an important management component and that more business leadership research is required to fully investigate this issue. This paper offers methodological contributions that are crucial because they help managers respond to new inquiries about how people, groups, and organisations behave and carry out specific tasks, such as how they effectively communicate and work together when facing leadership challenges.

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