The Employees Perspectives on the Adoption of DevOps

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I Introduction

Development and Operations (DevOps) is a collection of methodologies and cultural principles that is used within the software development industry [1]. The stated benefits of DevOps include increased corporate IT performance and productivity, lower software lifecycle costs, improved operational efficiency, and higher-quality software products [1]. However, the implementation of DevOps remains a difficult issue [2], [3], [4], [5]. The implementation of DevOps can become easier if employees perspectives will be considered. Nevertheless, limited understanding exists regarding practitioners' perspectives on effective DevOps adoption [6]. Therefore, the objective of the research is to study the employees' perspectives on the adoption of DevOps in a specific company.

II Literature Review

DevOps is a software quality-oriented approach aimed at reducing the gap between development and IT operations teams, even when they are distributed among different locations [7]. DevOps emphasizes building a collaborative culture and using automation to help team members interact effectively [8]. The main aim is to boost the delivery of software changes by improving the processes and encouraging continuous integration and delivery [9]. Moreover, DevOps focuses on optimizing organizational structures and policies, responding to external pressures, refining release processes, meeting quality demands, and addressing socio-technical challenges [8].

DevOps integration is a part of the software development process that helps improve software security, sustainability, and performance. Grande et al. [8] found that incorporation of DevOps leads to security improvement, and deployment predictability. Moreover, Azad et al. [10] explored various success factors categorized within the study and concluded that the integration of DevOps methodologies notably enhances performance engineering. Additionally, Plant et al. [11] and Port et al. [12] highlighted the beneficial effects of DevOps integration on improving software security and sustainability within companies.

However, the adoption of DevOps is still a challenging task due to such factors as being in a transitional phase or demonstrating a cautious approach toward complete automation [11]. Secondly, the complexity and range of skills required for successful DevOps implementation presents significant obstacles [8]. Thirdly, ineffective management of communication exacerbates coordination issues between development and operations teams [8]. Security remains a prominent concern, as inadequate management may lead to significant data breaches and service disruptions in DevOps-based applications [5]. Addressing these challenges requires innovative solutions. For example, the effectiveness of DevOps anomaly detection frameworks has been demonstrated in identifying and mitigating issues throughout the DevOps lifecycle [13].

III Research Design

The hypothesis is formulated based on the existing literature, leading to the selection of a deductive research design. The investigation focuses on conducting a case study concerning the integration of DevOps within a particular company and collecting the opinions of employees. To achieve this, the survey will be conducted both pre- and post-DevOps integration, necessitating a duration of approximately one year. This period will include the integration of DevOps practices along with a subsequent period of observation until distinguishable outcomes appear. Subsequently, a comprehensive analysis will arise, requiring an additional three-month period for research composition and documentation.

To gather data, an online survey with closed-ended questions will be conducted to collect the viewpoints of 400 employees. Company with more than 1000 employees without integrated DevOps will be chosen among Innopolis Special Economic Zone. Utilization of a non-probability sampling method is used due to the targeted nature of the survey among employees within a specific company, thereby necessitating the application of purposive sampling. Subsequent to data collection, qualitative analysis techniques will be employed for thorough examination and interpretation.

The reliance on employee opinions through surveys may introduce response bias. Moreover, the reliance on employee opinions through closed-ended survey questions may overlook other relevant sources of data.

IV Anticipated Results

The anticipated results of this study involve comparing two surveys to assess the impact of DevOps integration. Expected improvements include enhanced software development and deployment processes, improved communication and collaboration among teams, and an increase in the frequency of software releases. However, potential negative effects on job satisfaction are anticipated due to the challenges associated with employees adapting to DevOps practices. The challenges include the lack of the complex skillset, improper communication and resistance to change.

V Discussion

DevOps integration brings performance enhancements to the company, but it may be challenging for employees. Performance enhancement is expected to be similar to [14]. Understanding employees' perspectives can provide insights into the challenges, benefits, and potential barriers to adopting DevOps practices.

The results of the study may be used by companies that are trying to integrate DevOps in order to enhance convenience for their employees. Insights from employee perspectives can offer guidance on refining workflows, optimizing collaboration between teams, and identifying areas for improvement. This insights can lead to more efficient development processes and better integration of DevOps principles into the organization's culture. Without the insights from the research, organizations may allocate resources inefficiently in their efforts to implement DevOps practices.

The study is constrained by its focus on a single company, which may limit the generalizability of the findings. Additionally, the evaluation lacks the use of metrics against previous studies, such as [15]. Moreover, unlike [16], we have not developed a specific DevOps integration model based on the research findings. This limitation reduces the practical applicability of the results for guiding concrete implementation strategies in organizational contexts.

References

[1] L. E. Lwakatare, P. Kuvaja, and M. Oivo, "An exploratory study of devops extending the dimensions of devops with practices," *ICSEA 2016*, vol. 104, pp. 91–99, Aug. 2016. [Online]. Available: https://scholar.google.com/scholar?q=Lwakatare%2C%20L.E.%2C%20Kuvaja%2C%20P.%2C%20Oivo%2C%20M.%2C%202016.%20An%20exploratory%20study%20of%20DevOps%20extending%20the%20dimensions%20of%20DevOps%20with%20practices.%20pp.%2091%E2%80%9399., Accessed: 22 Apr., 2024.

[2] M. H. Tanzil, M. Sarker, G. Uddin, and A. Iqbal, "A mixed method study of devops challenges," *Inf. Softw. Technol.*, vol. 161, Sep. 2023, Art. no. 107244. DOI: 10.1016/j.infsof.2023.107244. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584923000988, Accessed: 21 Apr., 2024.

[3] J. Díaz *et al.*, "Harmonizing devops taxonomies — a grounded theory study," *J. Syst. Softw.*, vol. 208, Feb. 2024, Art. no. 111908. DOI: 10.1016/j.jss.2023.111908. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0164121223003035, Accessed: 29 Mar., 2024.

[4] D. E. Rzig, F. Hassan, and M. Kessentini, "An empirical study on ml devops adoption trends, efforts, and benefits analysis," *Inf. Softw. Technol.*, vol. 152, p. 107 037, 2022, ISSN: 0950-5849. DOI: https://doi.org/10.1016/j.infsof.2022.107037. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584922001537, Accessed: 21 Apr., 2024.

[5] G. Sriraman and S. R, "Slide-block: End-to-end amplified security to improve devops resilience through pattern-based authentication," *Heliyon*, vol. 10, no. 4, e26312, 2024, ISSN: 2405-8440. DOI: https://doi.org/10.1016/j.heliyon.2024.e26312.

[Online]. Available: https://www.sciencedirect.com/science/article/pii/S2405844024023430, Accessed: 23 Apr., 2024.

[6] W. P. Luz, G. Pinto, and R. Bonifácio, "Adopting devops in the real world: A theory, a model, and a case study," *J. Syst. Softw.*, vol. 157, Nov. 2019, Art. no. 110384. DOI: 10.1016/j.jss.2019.07.083. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0164121219301517, Accessed: 31 Mar., 2024.

[7] A. Mishra and Z. Otaiwi, "Devops and software quality: A systematic mapping," *Comput. Sci. Rev.*, vol. 38, p. 100 308, 2020, ISSN: 1574-0137. DOI: https://doi.org/10.1016/j.cosrev.2020.100308. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1574013720304081, Accessed: 27 Mar., 2024.

[8] R. Grande, A. Vizcaíno, and F. O. García, "Is it worth adopting devops practices in global software engineering? possible challenges and benefits," *Comput. Standards Interfaces*, vol. 87, Jan. 2024, Art. no. 103767. DOI: 10.1016/j.csi.2023.103767. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S092054892300048X, Accessed: 29 Mar., 2024.

[9] A. Hrusto, E. Engström, and P. Runeson, "Towards optimization of anomaly detection in devops," *Inf. Softw. Technol.*, vol. 160, Aug. 2023, Art. no. 107241. DOI: 10.1016/j.infsof.2023.107241. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584923000952, Accessed: 28 Mar., 2024.

[10] N. Azad and S. Hyrynsalmi, "Devops critical success factors — a systematic literature review," *Inf. Softw. Technol.*, vol. 157, May 2023, Art. no. 107150. DOI: 10.1016/j.infsof.2023.107150. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584923000046, Accessed: 30 Mar., 2024.

[11] O. H. Plant, J. van Hillegersberg, and A. Aldea, "Rethinking it governance: Designing a framework for mitigating risk and fostering internal control in a devops environment," *Int. J. Accounting Inf. Syst.*, vol. 45, p. 100 560, 2022, ISSN: 1467-0895. DOI: https://doi.org/10.1016/j.accinf.2022.100560. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1467089522000124, Accessed: 28 Mar., 2024.

[12] D. Port, B. Taber, and P. Emkani, "Investigating effectiveness and compliance to devops policies and practices for managing productivity and quality variability," *J. Syst. Softw.*, p. 112 030, 2024, ISSN: 0164-1212. DOI: https://doi.org/10.1016/j.jss.2024.112030. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0164121224000736, Accessed: 26 Mar., 2024.

[13] A. H. Fawzy, K. Wassif, and H. Moussa, "Framework for automatic detection of anomalies in devops," *Comput. Inf. Sciences*, vol. 35, no. 3, pp. 8–19, 2023, ISSN: 1319-1578. DOI: https://doi.org/10.1016/j.jksuci.2023.02.010. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1319157823000393, Accessed: 29 Mar., 2024.

[14] L. E. Lwakatare, T. Kilamo, T. Karvonen, *et al.*, "Devops in practice: A multiple case study of five companies," *Inf. Softw. Technol.*, vol. 114, pp. 217–230, 2019. DOI: https://doi.org/10.1016/j.infsof.2019.06.010. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584917302793, Accessed: 17 Apr., 2024.

[15] L. Giamattei, A. Guerriero, R. Pietrantuono, *et al.*, "Monitoring tools for devops and microservices: A systematic grey literature review," *J. Syst. Softw.*, vol. 208, p. 111 906, 2024, ISSN: 0164-1212. DOI: https://doi.org/10.1016/j.jss.2023.111906. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0164121223003011, Accessed: 20 Apr., 2024.

[16] A. Wiedemann, M. Wiesche, H. Gewald, and H. Krcmar, "Integrating development and operations teams: A control approach for devops," *Inf. and Organization*, vol. 33, no. 3, p. 100 474, 2023, ISSN: 1471-7727. DOI: https://doi.org/10.1016/j.infoandorg.2023.100474. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1471772723000283, Accessed: 19 Apr., 2024.