UNIVERSITY OF SALERNO

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MASTER THESIS

Understanding Diversity Challenges And Solutions In DevOps: A Survey Study

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"Diversity is a mix and inclusion is making the mix work."

— *Andrés Tapia*

Abstract

The discourse on diversity extends across various knowledge domains, including DevOps.Certain groups, particularly in terms of race, age, culture, ethnicity are notably underrepresented when discussing diversity in DevOps. This thesis aims to help practitioners in gaining a deeper understanding of diversity aspects and the challenges associated with adopting DevOps. Using an online survey, we obtained data from 52 professionals working in software development teams. The study investigates the challenges of diversity aspects through state-of-the-art and coding approach. It emphasizes the importance of cultural change as a significant barrier between development and operations, hindering the implementation of DevOps practices.

Additionally, the findings reveals that cultural norms and communication issues, Lack of collaboration, rooted in communication issues and inclusion is identified as a critical challenge. The results of this study highlights valuable insights that assist organizations avoiding key diversity-related challenge in DevOps.

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CHAPTER 1

Introduction

1.1   Application Context

Diversity in DevOps teams is a critical factor in driving innovation, problem-solving, and overall success in the ever-evolving landscape of technology.[2] Embracing diversity not only contributes to a more inclusive work environment but also enhances the adaptability and resilience of DevOps practices. While the current state of DevOps reflects a growing emphasis on automation, collaboration, and infrastructure as code, organizations must address cultural barriers and skill gaps to fully realize the potential of DevOps methodologies. [2, 3, 4, 1] Thus this paper talks about the diversity challenges and solution in DevOps which is the survey based study. The data is being collected with the help of the survey from the selected 52 respondents with the help of which the analysis is made in order to understand the challenges and the diversity aspect for the DevOps.As we navigate these challenges, the commitment to diversity will remain a key ingredient in shaping the future of DevOps.

1.2   Motivation and Objectives

Previous research and studies have widely acknowledged the detrimental impact of a lack of diversity in DevOps teams, serving as a significant source of challenges and inefficiencies. The absence of diverse perspectives and experiences has been linked to decreased innovation, heightened workplace tensions, and a higher likelihood of errors, contributing to lower overall productivity and increased rework for DevOps practitioners. Recognizing and addressing diversity issues in DevOps teams is crucial for reducing maintenance issues and fostering a more inclusive, collaborative, and high-performing environment.

Therefore, this study provides major understanding of the DevOps challenges along with the diversity prospect is being understand with the help of the literature. The research is being designed based on the two main research question that talks about the challenges which the diverse people experience and the solution that could be employed to such challenges.

1.3   Achieved Results

The data of this study shows that respondents have given the different opinions according to their understanding of the challenges and diversity of the cultures. The total of 53 respondents has answered the Survey questions and most of the respondent believes that the communication barrier and multiculturalism are the key factors which can be considered as a challenge in DevOps. Some of the other respondent also believes critical thinking as the factor between homogeneous teams and a diverse team that could be a different. Hence it can be concluded that according to the most of the respondents in general diversity in the context of the DevOps refers to the people with varied backgrounds and the experiences. The most common challenges in this context is considered to be communication barriers, diversity training and practices and multiculturalism that exist within the organization.

1.4 Structure of Thesis

The structure of the thesis is divided into six chapters as follows;

• **Chapter 1:** <u>Introduction:</u> In this chapter, the motivations and the objectives are presented which are the basis of the choice regarding the topic studied and the achieved results.

• **Chapter 2:** <u>Background and State of the Art:</u> This chapter illustrates the current state of the art through scientific papers with the aim of deepening all the topics covered and explaining all the notions that underlie this research.

• **Chapter 3:** <u>Research Methodology:</u> This chapter shows the various methodologies used to obtain the evolutionary data and to find out the answer to the research question.

• **Chapter 4:** <u>Analysis of the Result:</u> In this chapter, it is described how the obtained data analyzed and what the results have been acquired from the carried out research.

• **Chapter 5:** <u>Discussion:</u> This chapter briefly discuss the results and findings of the study.

• **Chapter 6:** <u>Conclusions:</u> The last chapter summarizes the outcomes and provide conclusion on the thesis.

CHAPTER 2

Literature Review

2.1 Background

Diversity is discussed by different knowledge areas and these discussions, specifically in Software Engineering, are increasing day by day. Gender diversity has indeed become a subject of growing interest among both practitioners and researchers. Software Development has become more and more collaborative, with different people forming software development teams. Lately, in their work, they discussed about underrepresented groups, like gender, ethnic, cultural, etc. Technological companies have to encourage diversity within software development teams, and several firms are taking on this challenge [5]. In DevOps teams, diversity and inclusion play crucial roles in fostering a positive and innovative work environment. These concepts promote the idea that teams benefit from a diverse mix of people with varied backgrounds, perspectives, and experiences. There are a number of dimensions to diversity in the technology workforce, as regards ethnicity, age, gender and people with disabilities [3], Perspectives on how people feel about themselves, such as How they feel about other people, and how that perception affects their Interactions within the work environment [5]. Traditionally, diverse teams in the software teams are ¬needed, as they; effects team performance, software processes and organizational

outcomes. Studies also describes that diversity shapes better teams and delivers improved results, among other benefits [3]. That is why DevOps is a widely discussed term in software development process and fast delivery of customer demanded software solutions. However, what is DevOps exactly, what concepts and results are significant? A survey study is performed to answer that question. The following thesis provides a review of DevOps analyses what are the challenges that diverse people experience in each phase of the DevOps pipeline and what solutions could be applied to such challenges an outlook on future research.

2.2 State of the Art

Trinkenreich et al.[1] have discussed diversity in their work, primarily focusing on gender diversity. The goal of their study is to identify the characteristics of women who contribute to open-source software (OSS), the ways in which women contribute, the acceptance rates of their contributions, their motivations to participate, the challenges they face as OSS contributors, and the strategies OSS communities can employ to attract and retain women. In this study the participation of women is analyzed through 7 different perspectives: Representation of women in OSS projects, Demographics of women contributors to OSS, Types of contributions that women make in OSS projects, Acceptance rate of women's contributions in OSS projects, Motivations that drive women to participate in OSS projects, Challenges faced by women when contributing to OSS projects, Strategies to increase women's participation in OSS projects.

The Finding of their study shows that women represent about 9.8 of Open Source Software contributors that includes different types of participation. They are mostly extant in community centric roles rather than as developers. Women get recognition if they work in pairs but if they stand alone they hardly get appreciation that is why they also faces many social challenges while contributing to OSS like lack of peer parity, non-inclusive communication, a toxic culture, impostor syndrome, community reception issues, stereotyping, and work-life balance issues. Furthermore, OSS communities that are in need to increase women participation can cre-

ate awareness through promoting inclusive language, organizing women-specific groups and events, de-stereotyping the OSS contributor, encouraging and welcoming women, placing women in leadership, adopting de-biasing tools, recognizing women's achievement, preparing mentors to guide women, and creating and enforcing a code of conduct. In their work, they also highlighted future gab that there should be an in-depth analysis of women's motivations, challenges, reasons that would make them leave, have their place in the community, and their observations regarding OSS communities' success.

Perez et al. [4], in their study, aimed to clarify the research area concerned with perceived diversity in Software Engineering. According to their investigation, gender diversity studies have been growing during the past decade, and including women in software teams brings numerous benefits that positively affect the team and the organization as a whole. However, less is known about how other perceived diversity factors, such as race, nationality, disability, and age of developers, are related to Software Engineering. They claimed that instead of creating strategies and tools to address the gender diversity concerns encountered in SE, individual research have often taken a gender diversity approach that focuses on demonstrating gender bias or inequalities between genders. They highlighted that the field of software engineering involves collaboration between numerous different software developers in order to create software. A software development team has a better chance of understanding and resembling the needs of the end user the more diverse its members are. In this study, they prove that women increase productivity, performance, and efficiency. However, unfortunately, some developers still have a strong bias against women in OSS and industry. They also identify the four perceived diversity components (age, nationality, gender, and race).

Menezes et al. [3], in their study, analyzed the characteristics of diversity in Software Engineering and how to adapt software engineering practices when teams have diverse characteristics. In their systematic literature review (SLR), most of the studies focus on gender-related issues and professional practices, revealing that men tend to dominate workplaces, contributing to a homogeneous IT environment.

However, some studies also suggest ways to make the IT environment more heterogeneous.There are certain barriers need to be overcome as women considered to be technically inferior at the work however no study came up that proves women do less work than men. They identify impacts of diversity that are observed in Software development teams and highlight the challenges, barriers in the work place also diversity and inclusion affect Software teams positively. This paper has limitations as diversity has several dimensions that could affect diverse teams in different ways, according to culture, place, etc.

Silveira et al. [6] discussed diversity in their study in depth, explaining that diversity provides better teamwork. They mentioned that cognitive diversity yields better results in tasks such as problem-solving and predicting, and it is influenced by identity diversity, for example, gender, age, and race. They conducted a systematic mapping with an inventory of papers on how diversity has been discussed in Software Engineering and Agile Methodologies. In their study, they also highlighted what kind of diversity the paper is approaching. Identity or cognitive. The conversation about the importance of diversity in software engineering has a lot of room to grow beyond gender issues or to improve the connection between gender and other different traits like race/ethnicity, age, and culture.

Blincoe et al. [7] conducted research on Perceptions of Gender Diversity's Impact on Mood in Software Development Teams. They performed a study to investigate perceptions of whether and how gender diversity affects the disposition and comfort of IT teams, aiming to offer new insights into the challenges influencing the workplace environment. They also focused on the issue of gender discrimination, which, when it occurs, has a significant impact on employees and the workplace as a whole. In their study, the findings revealed that a significant majority of employees in the IT sector perceived the work atmosphere in gender-diverse teams as more pleasant. Interestingly, only a small number of male participants indicated a preference for working in an all-male environment.

Bosu et al. [5] conducted research on Diversity and Inclusion in Open Source

Software (OSS) Projects: Where Do We Stand? The main aim of this study is to assess the extent of gender diversity within well-known Open Source Software (OSS) projects and examine the existence of gender biases that could potentially hinder female participation. Based on the results of their research, they draw the conclusion that promoting and providing mentorship opportunities for females in leadership positions could serve as an effective solution to encourage gender diversity.

CHAPTER 3

Research Methodology

This chapter outlines the methodology employed to describe and evaluate the research methodology utilized for investigating the variables of interest. It provides a comprehensive description of the tools, research models, and data collection methods applied in this research. The alignment between the methodology and research design ensures comprehensive coverage of data collection procedures, instrument reliability, and measurement techniques.

3.1   Methodology

In this section, we have comprehensively documented all the stages of our thesis, including formulating research questions that define the review's purpose, establishing criteria for including or excluding studies, and outlining the process, we employed to identify relevant research. The research questions played a pivotal role in shaping our review's objectives. Our inclusion and exclusion criteria were instrumental in evaluating each potential study's suitability for inclusion. The research selection process was instrumental in maximizing the collection of studies pertinent to our research questions.

3.2   Research Questions

We undertook this study to gain insights into the following query: How has the concept of diversity impacts DevOps teams? In pursuit of this objective, we formulated two distinct research questions (RQs):

RQ 1: *What are the challenges that diverse people experience in DevOps?*
RQ 2: *What solutions could be employed to such challenges?*

3.3   Research Design

Research design is an idea used by the researchers to describe the process and method for the research or collecting data to find out the required and important information. (Zikmund, 2003). The core fundamentals of dilemma for research scholars to establish relevance to subject's ranges and discipline are constructivism, critical realism, constructivism and other has incompatible applications to 'quantitative-qualitative' discussion. (Mkansi, 2012). In the interview of the one hundred and fifteen doctoral management students (Sahay 2016) find that most of their research were concerned with the research questions and the research objectives. Their research were starting from which tools should be used and what method should

be used. In this thesis, we used a survey-centered approach that consists on the broad concept of gender diversity (Nationality, race, age, culture etc.) in Software Engineering - DevOps. We performed a survey based on questionnaire that involves practitioners from all over the world who are working in software development teams. This methodology is selected because surveys are dependable and simple to use instruments for gathering data from the real world. There are no restrictions placed on gender, years of experience, geographical location, or company affiliation. The online tool Google forms was used to write the survey and "Prolific" was used for survey distribution. The data was exported from Google Forms and then imported into Excel sheets.

3.4   Data Collection

All participants were provided with one-page online survey accessible through an anonymous link, which was distributed via prolific channel. The final survey composed of 13 questions with 04 closed-ended and 09 open-ended questions. The initial five questions characterized the participant by asking about their Prolific ID, Age, promoting diversity and Inclusion in Software development teams, level of team's distribution and diversity aspects. The next five questions comprised of team's progress or productivity is affected by its diversity or absence, Diverse team's problem solving perspectives, the Impact of Diversity on Team Communication and Dynamics, Diverse teams, recognition and opportunities, Experience of discrimination in Software Development, leadership and diversity in development teams and actions that can implement to promote diversity and inclusion. The last question asked about to provide any additional comments related to diversity and inclusion.

3.5   Survey Questions

In our survey, the following questions were included to collect information.

Table 3.1: Questions in survey [1]

| #	Question
1	Have you ever worked in a DevOps team?
2	Have you ever worked on a software development team with a diverse mix of gender/age/race/culture/disability?
3	Can you please describe the diversity aspects of the team(s) you worked in?
4	Do you think that the progress or productivity of a team is influenced by diversity or lack of it? Why?
5	In your opinion, in what ways does a diverse team conduct problem-solving differently than a homogenous team?
6	To what extent do you believe diversity affects team communication and dynamics?
7	Based on your experience, how do diverse people receive recognition, opportunities, and accomplishment in development teams?
8	Have you or your colleagues ever experienced discrimination in a software development team? Please Explain.
9	Do you think that diversity is neglected when it comes to leading development teams?
10	What steps do you think software development teams can take to ensure diversity and inclusion?
11	Would you like to share further comments?

Results And Analysis

In this section, the results are presented and discussed:

4.1   Survey Analysis

This section discuss the analysis of the results of the survey. The research survey was conducted which has both open-ended and dichotomous questions. The research analysis was performed using SPSS Further dichotomous questions to understand the characteristics of the sample that is being chosen. The only survivors conducted with the help of Google Forms and all of the DevOps practitioners are targeted. There are a total of 53 responses that have been collected. The frequency table explains all those respondents and it is very clear that people from age 20 to 30 are about 63 percent from all of the respondents.30 percent of the respondents are from the age bracket of 31 to 40.Almost 79 percent of the respondents worked in a developed team before while 86 percent of all the respondents have worked on a software development team with a diverse mix of gender, age, race and disability. Other questions that are included in the research survey talk about the surface-level diversity aspect and deep-level diversity aspects of the teams in which the respondents have worked.
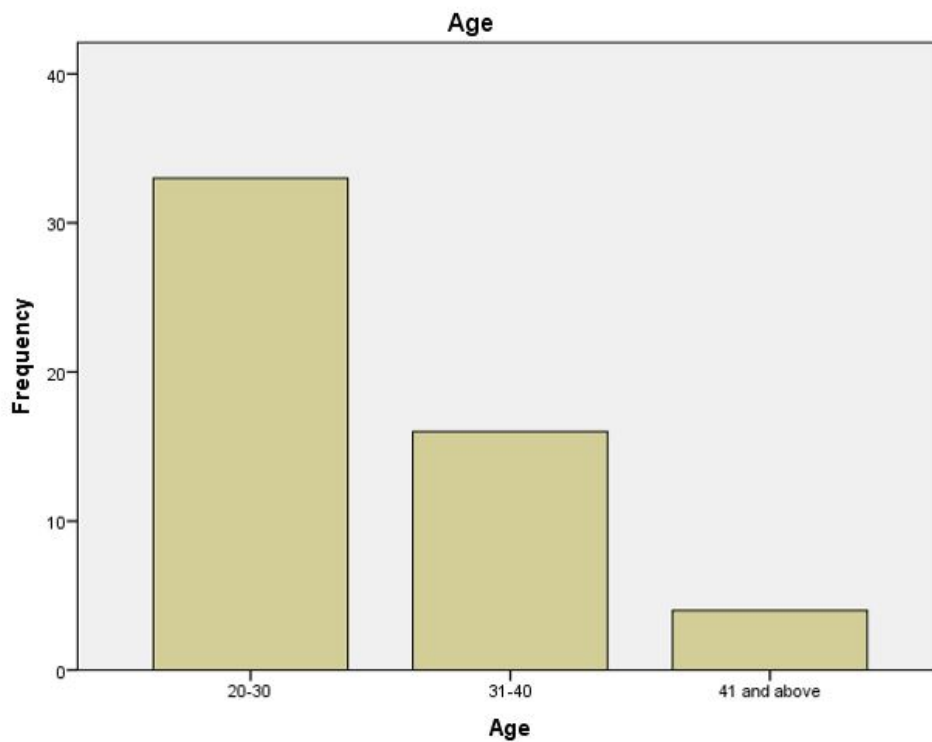
The responses of the respondents vary in this part of the survey. Most of the answers were related to the culture as the main aspect of the team for diversity. There are mixed answers from the respondents regarding the progress or productivity of the team and whether it is influenced by diversity. The respondents who think that progress or any type of productivity of our team is influenced by diversity believe that people from different cultures pool in to create that diversity within the team.

## 4.2   Categories and concepts

Here we detail our understanding of the category, which we refer to as Diversity, Multiculturalism, and Bias, professional development, Diversity recruitment and Team communication. Codes are highlighted as Cultural background, communication styles, diverse team , communication barrier, Equity throughout the text in italics along with excerpts of the survey answers to make explicit the chain of evidence.

Diversity category emerges as a result of set of codes that characterizes these

aspects: Age, culture, gender, Inclusion, race and team. Diversity plays an important and very positive role in software development teams as it brings more skills and solutions. The team that has more people that are diverse they are more successful. The data show that some participating organizations like *ID046*, mentioned that the team that embraced a mix of global backgrounds, technical skills, and experience levels, fostering a culture of learning and creativity. This diversity of perspectives contributed to the team's success by enabling innovative problem solving through varied ideas and experiences.

ID046 *"The DevOps team I worked in was diverse in terms of: Gender: The team was about 50 percent female, which is higher than the industry average. Race and ethnicity: The team was made up of people from all over the world, with a variety of cultural backgrounds. Technical skills: The team had a wide range of technical skills, from experienced engineers to recent graduates. Experience: The team had a mix of experienced and new engineers, which helped to create a culture of learning and sharing. I believe that this diversity of perspectives and experiences helped to make the team more successful. We were able to bring different ideas to the table and solve problems in new and creative ways."*

Some participants highlighted that DevOps teams have dependencies that leads to Organizational constraints. These constraints are due to lack of communication and language barrier. Although, these constraints generate cultural differences between development teams. The data show that some participants like ID051 and ID053, when teams are diverse, there tends to be a decline in innovation and creativity. This is often attributed to cultural clashes and differences in values among team members. As a result, teams with a more homogenous composition, where individuals share similar cultural backgrounds and values, create an atmosphere characterized by honest communication, robust collaboration, and increased productivity. This preference is based on the belief that a more uniform team dynamic leads to a more cohesive and efficient working environment.
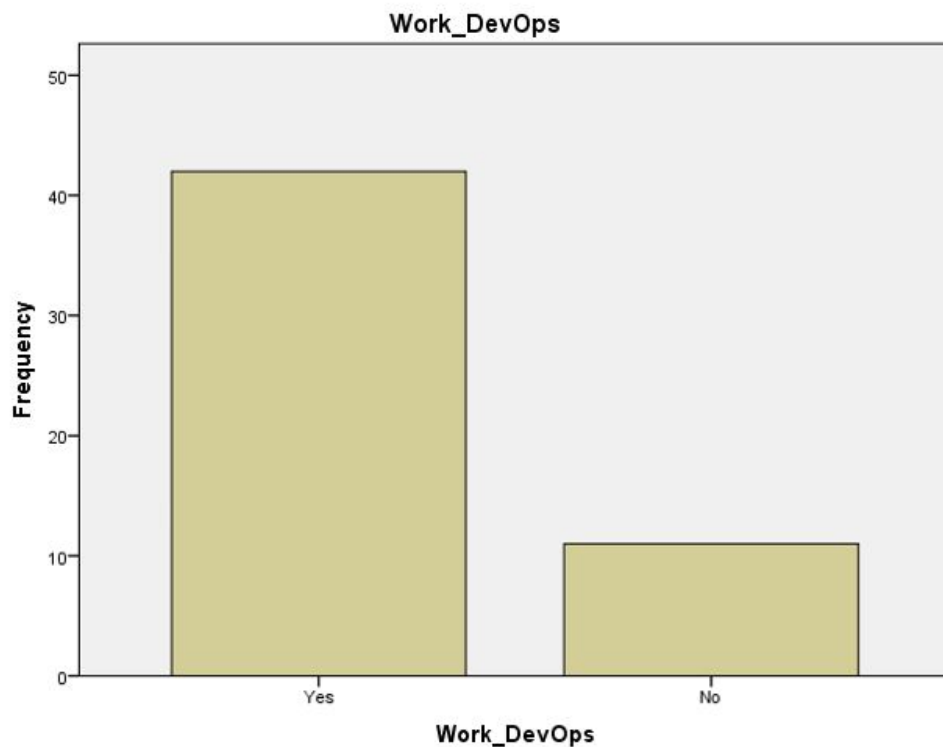
ID051 *"I have only experienced a decline in innovation and creativity. Cultural clashes and values do not align. I prefer homogenous teams. The atmosphere is honest, robust and productive."*

ID053 *"In my personal experience very little, passion and personal motivations are more important If we count mother language difference then yes. Everybody communicates smoother in their mother language."*

Some respondents talks about the influence by diversity on the productivity of the team. Around 75 percent of respondents believe that the productivity within the team always influenced by the diversity. The data shows that participants like ID047 believe that when there is a diversity within the team it brings in more ideas and the different people think differently.

ID047 *"Yes, I believe that the progress or productivity of a team is influenced by diversity or lack of it. Diverse teams are more likely to be creative and innovative, as they have a wider range of perspectives to draw from. They are also better at problem-solving, as they*

Worked_software_development_team
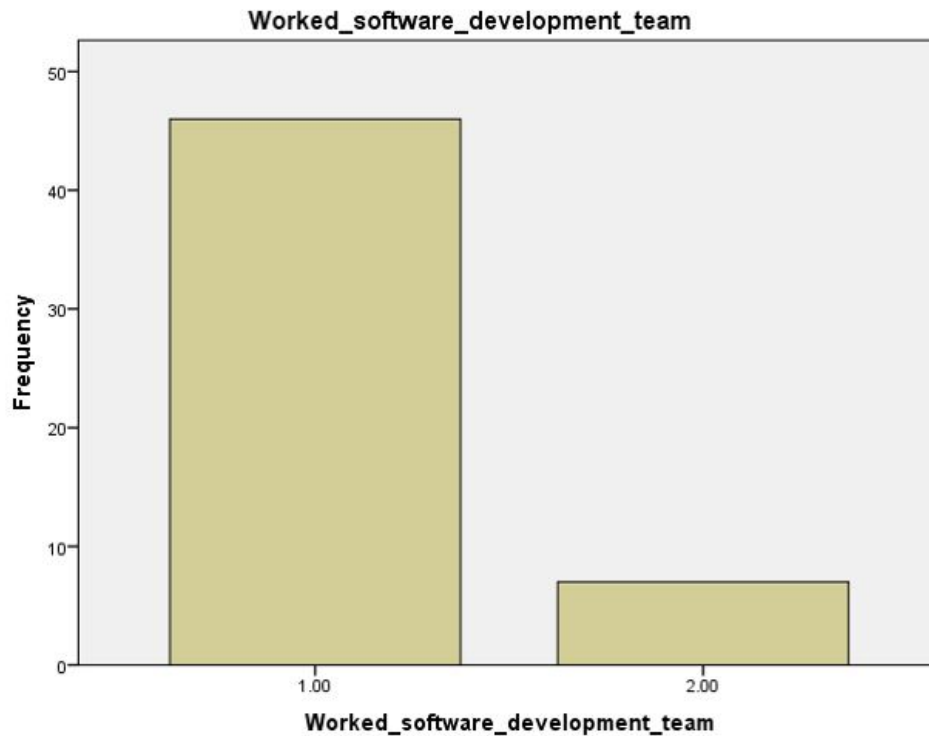
can approach problems from different angles. Additionally, diverse teams are more likely to
be satisfied with their work, as they feel more included and valued. Diverse teams are more
likely to come up with new and innovative solutions to problems. This is because they have a
wider range of perspectives to draw from, which can lead to more creative and out-of-the-box
thinking." All of those respondent who answered this question in and all believe that
the diversity of the team is mainly been influenced by the practise and skills rather
than diversity. Around 2 percent of this opponent does not believe much about the
productivity of the team in the DevOps along with not understanding much details
about the question.

While using these codes, we realised that cultural diversity and Multiculturalism
is the main aspect that would help Development teams in problem-solving. It means
that People from different backgrounds can able to solve problems as compared to
homogeneous teams. Any of the diverse teams have the worst perspective when it
comes to problem solving which is being supported by their wide range of experi-
ences. This type of team is also able to create innovation in problem-solving which

could be helpful for the organization based on the novel approaches. According to most of the respondents, critical thinking is one of the factors that differentiate between a homogeneous team and a diverse team. For example some of the participants answered this question in a way that since both of the teams share different opinions so they are different. One of the respondent elaborated the answer as "A diverse team (employees of some company) is made up of people with different backgrounds, experiences and cultural "influences". This diversity leads to a wider range of perspectives when analysing and understanding problems. Each team member brings his/her/its own perspective, which can lead to a more comprehensive problem assessment and innovative solutions". In detail, almost 95percent of the respondents did not much able to differentiate in detail about the basic difference between a problem solving and a homogeneous teams.

It is being answered by the respondents based on different unique factors. Most of the respondents believe that problem-solving is one of the characteristics of a diverse team which brings different types of perspectives and approaches to problem-solving. Communication is another important factor that is being answered by the respondent regarding this differentiation. Some of the other respondents talk about conflict resolution as a key factor that could affect team communication and dynamics when solving problems in any of the environments. The rest of the respondent talked about adaptability and skill set as the key factors that could affect the communication of the diverse team directly imposing an impact on their team dynamics.

One of the respondent talk about this question's in the prospect that in certain aspects yes communication can be influenced due to multicultural groups, different languages can influence this. For example if an Indian who had grown up speaking Hindi and struggles to speak English who is part of your team, this can cause issues with regards to communication. Another respondent prospect is that diversity may greatly affect team communication and dynamics if there is a language barrier, this may make it difficult to get certain points across or worse isolating certain people in the team. In summary, 90 percent of the respondents believes that diversity does affect team communication and dynamics.

This question was asked based on the individual experiences of the respondents. There are multiple answers to it under the personal experience of DevOps. The respondents talk about criteria for regulation and secondly the culture of equity as a key factor through which people can able to receive recognition and accomplishment in the development teams. Under the mindset of DevOps and its development, the respondent also talked about equal access to opportunity, Performance feedback, and training and development as the key that would provide a wide range of opportunities for the teams to develop them and make them recognized at a broader scale.

One of the respondent said that any recognition, opportunities and accomplishments is based on your proven effect in excellence towards your contributions to the team. Another respondent answered that diverse people in development teams can receive recognition, opportunities, and accomplishment through their work, contributions to the team, and relationships with others. By creating a culture of inclusion, providing opportunities for mentorship, and celebrating diversity, teams can create an environment where diverse people are more likely to succeed. Around 77 percent of the respondents answered this question with a logical aspect of environment and background, while rest of the respondents did not give detailed logical answers.

Although,70 percent of the respondents believed that diversity is not neglected when it comes to leading development teams while the rest of 30 percent believed that it does. These 30 percent mostly talked about biases, lack of awareness, and most of all the typical hiring practices that always lead toward diversity being neglected. For example one of the respondent who answered this as Yes, believes that it is especially when it comes to large-scale, corporate providers.
This question has some of the unique answers by the respondent under their understanding of software development teams and diversity. Leadership, hiring practices, the job description, and the training and development for the employees are the major set of answers that are being talked about by the respondents. Few despondent talks about communication as the main set of facts that would be able to ensure diversity and inclusion in a software development team.

Every respondent shared his or her own justification for this question but most of the respondents answered the question in same way. For example the same respondent's answers about the steps are encourage open communication and respect for different perspectives. Other common answers are fostering a culture of inclusion and acceptance. These two answers are mostly been answered by respondents so it means that open communication and fostering a culture are common steps that could be taken to ensure diversity and inclusion.

4.3   Research Question Prospect:

4.3.1   Challenges that diverse people experience

The first research question talks about the challenges that the diverse people experience when working in DevOps teams. Looking at the survey and the questions that are being answered by the respondents, the devOps teams are facing variety of challenges along with the different prospect from the respondent's point of view. The main challenge is the communication barrier which is considered to be the most talked about challenge for the DevOps teams for example: ID025 experienced communication gap as It says "As long as there is no language barrier, I believe there is no problem in communication. However, some cultural differences -like respecting personal space etc.- could become an issue very fast". Since people belong to the different culture background so there is always an issue of language proficiency. Another main challenge that is highlighted by the respondent is the cultural difference. In this very challenge the respondent talks about the working styles, the overall value to work and expectation from the employees. The third important challenge that is being highlighted in this research talks about the different working style by the diverse teams that is one of the key challenges for the DevOps. The last and the most important challenge that the diverse people experience is the career advancement barriers. When working in the DevOps teams, the different individual faces hindrances in accessing the same career development opportunities as their peers. This is due to the lack of mentorship and the proper training.

4.3.2 What solutions could be employed to such challenges?

Following are the different solutions that would be helpful in addressing the challenges faced by the diverse individual in DevOps teams.

a) The very first solution to the challenges diversity training. It means that implementing and regularising the diversity and inclusion off training of all the team members.

b) The next solution is inclusive culture building which means that upbringing the type of culture that is valuable and help in celebrating the diversity. It also helps in establishing the practises in team processes and meetings which also led to decision making processes to ensure everyone has an equal opportunity to contribute.

c) The third solution is mentorship and sponsorship programme for the team members. There should be encouragement in sponsorships which leaders effectively advocate for the cash advancement of the DevOps team members.

d) The next solution is diverse hiring practises which leads toward implementing the unbiased hiring of people.

e) There also should be a clear career development path that provides A transparent career development and accessible to everyone. There also should be a performance review process that are free from biases and ensure objective assessments.

f) The last and the most effective solution is the regular feedback we should be conducted to experience that diversity member overall thought process. It also helps in promoting the flexibility and implementing the flexible work arrangements to accommodate different working styles.

CHAPTER 5

Discussion

This thesis is based on an open-ended and dichotomous questionnaire. Some of the results were analyzed with the help of SPSS which gives the frequency of the initial data. The research open-ended questions about the development challenges are asked from the respondents which give a unique set of outcomes for this research study. Literature is one of the key supporting criteria that is used based on the inclusion criteria for supporting the relative outcome of the study. Some of the vital challenges include the lack of collaboration and communication, the lack of skills and knowledge, the lack of proper training and development phase for the team, the lack of DevOps based approach, and finally the lack of confidence and trust. For example: ID08 mentioned that The work environment should Encourage open communication and respect for different perspectives. Also, they should Actively recruit diverse candidates Some of the respondents also talk about inappropriate compensation as one of the key challenges that is related to diversity in DevOps. For example : ID13 experienced discrimination in a multiracial team highlights challenges arising from diverse cultures and religions.

The empirical research that has been used in this study helps in identifying the different practices and critical challenges that may be part of other organizations as well. There are several researches that have been associated with the field of DevOps

along with the development tools but less of the researchers found talks about the challenges of diversity for the DevOps.

5.1 Diversity Challenge And Mitigation Strategy

5.1.1 Leadership

5.1.1.1 Limited Representation in Leadership Roles

1. *Diverse Leadership Development Programs:* Implement programs to identify and nurture diverse talent for leadership roles.

2. *Mentorship and Sponsorship:* Establish mentorship and sponsorship programs to support the growth and development of diverse leaders.

5.1.2 Communication Behaviour

5.1.2.1 Differences in Communication Styles

1. *Communication Training:* Provide training on effective communication, active listening, and understanding different communication styles..

2. *Foster an Inclusive Communication Culture:* Encourage open dialogue, respect for diverse perspectives, and the value of each team member's voice.

5.1.3 Hiring Practices

5.1.3.1 Unconscious Bias in Hiring

1. *Inclusive Job Postings:* Use inclusive language and focus on skills and qualifications rather than specific backgrounds or experiences.

2. *Blind Recruitment:* Implement practices to remove personal information that could lead to biases during the initial screening process.

3. ***Diverse Interview Panels:*** Ensure interview panels represent a variety of backgrounds to minimize biases in the evaluation process.

5.1.4   Lack of Training and Development

5.1.4.1   Unequal Access to Learning Opportunities

1. ***Tailored Training Programs:*** Offer training programs that cater to the unique needs and aspirations of team members from diverse backgrounds.

5.2   Limitations of the study

In this section, it is discussed in detail about thread to the validity of this study.

5.2.1   Threats to Construct Validity

Since the research question is related to the diversity aspects and challenges in Devops. Hence, The main goal of this study is to gain a comprehensive understanding of how diversity aspects manifest in DevOps by analyzing quantitative insights derived from evolutionary data.A potential threat to the validity of the constructs in this study could arise from the selection of diversity aspects for analysis. It is crucial to recognize that the chosen set of attributes may not cover all pertinent properties related to diversity in the context of DevOps. There exists the possibility that certain aspects were overlooked during the analysis, or alternatively, there could be instances of unintentionally identifying false positives in the data. This acknowledgment is essential to maintain transparency and to highlight the limitations of the study in capturing the full spectrum of diversity aspects within DevOps teams.

5.2.2   Threats to Internal Validity

The study solely analyzes diversity aspects in a particular software development teams, which may not be representative of the entire software industry. Moreover, it

is important to note that this study has certain limitations. It considers a specific set of diversity aspects, neglecting the possibility of other aspects that may exist. This narrow focus could potentially overlook important diversity aspects that may have different effects on software teams.

5.2.3 Threats to Conclusion Validity

A threat of this kind which might affect the validity of our study is related with the Sampling. The respondents of the survey are not representative of the broader DevOps community, the conclusions may not be applicable to a wider context.

CHAPTER 6

Conclusion

This research thesis investigates the different challenges of diversity aspects and solutions in DevOps. The research analysis that is performed in this research this is survey based after gathering the data through the questionnaire from the targeted 52 respondents. The questionnaire contain both open-ended and closed ended question, which become helpful in understanding the exact challenges of diversity aspects in context with the Devops. The result that is being formulated sure some of the most common answers by the respondent which includes communication barrier and Cultural Diversity is one of the key challenges in the DevOps. In order to understand about the past study that has been conducted in this regard, a thorough literature review is conducted. This literature review helps in understanding about the other research studies which has been conducted regarding with different diversity aspects along with the results in the field of DevOps. Now looking at the research design of this thesis, the whole research is based on two research questions as a part of the research methodology.

Findings: The result from the survey analysis is also backed by the literature review which is conducted to understand and define challenges and aspects in other research study. It very much fulfilled the purpose of understanding the challenges

of diversity aspects in DevOps and able to plan the strategies for their mitigation. Based on the very result of the survey that has been conducted with the help of SPSS and analysis of the survey questionnaire dichotomous questions, the most talked about challenges with the diversity aspects in Devops is the difference in cultural norms and communication issues. The lack of collaboration which is based on the communication is another most critical challenges which is being identified as well. One of the most important goal of this research study is to provide the DevOps organization with the background knowledge so that they could able to understand the different challenges of diversity aspects add in future it will be helpful for them and implementing successful DevOps cultural adoptions.

Future Research: The study contributes to ongoing efforts to improve and develop a dev op cultural challenges model based on the communication issues and aspects which would be more fruitful for the other organization dealing with the software development.

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