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OPTIMAL WORKFORCE ALLOCATION FOR QUALITY DELIVERY IN DEVOPS TEAMS: A CASE STUDY

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ABSTRACT

Software development, integration, deployment, and operational management necessitate a diverse array of complex skills. Additionally, there is a growing demand for organizations to expedite the delivery of product-based applications and services compared to traditional software development methods, all while adhering to specific cost, speed, and quality criteria. To address these challenges, IT organizations adopt a DevOps approach, structuring their software teams to integrate development and operations seamlessly. As the complexity varies across different product lines, determining the ideal mix of DevOps workforce becomes important. In this case study, we formulated a generic DevOps workforce profile for product line delivery using stratified systems theory, which considers weighted factors influencing the workforce mix. We then compared this profile with actual workforce data to identify the optimal alignment. Furthermore, qualitative data from 17 product line owners within the organization delineated their key considerations when allocating workforce to DevOps teams. By conducting a thematic analysis of these considerations, we refined the workforce allocation method and proposed a set of systematic guidelines to help organizations better grasp the distribution of DevOps workforce mix, thereby enabling them to staff teams with an optimal balance of expertise, delivery quality, and operational efficiency. This enhanced understanding can further inform talent development and allocation strategies.

KEYWORDS

Stratified Systems Theory, Workforce Optimization, Sustainability, DevOps Workforce Allocation

1. INTRODUCTION

Changing technologies and new ways of working are disrupting employees' jobs and current skill sets; consequently, organizations face potential shortages of skills critical to growing their business (Agrawal et al., 2020). As a result, organizations have the challenge of managing talent and staff teams with people with the right skills and skill levels (Wiblen and Marler, 2019, Dery and Sebastian, 2017). Additionally, worldwide economic pressures are forcing organizations to examine their IT team structures and how they are organized (Yu and Zhou, 2021, Larson and DeChurch, 2020). This is also the case for major technology companies such as Twitter (Forbes, 2022) and Meta (Meta, 2023). Organizations that fail to optimize their team allocations within this context are considered inefficient (Barambones et al., 2021).

Given these challenges, IT organizations structure their software teams around development and operations (DevOps), exploiting a combination of practices and tools designed to increase the organization's ability to deliver applications and services faster than traditional software development processes (Senapathi et al., 2018, Lwakatare et al., 2016). Such a DevOps team incorporates developers and IT operations employees working collaboratively throughout a software product's lifecycle. The DevOps team allocation attempts to address organizational structures that hinder cross-functional alignment across different subunits within the IT function (Jabbari et al., 2016, Wiedemann et al., 2020).

According to López-Fernández et al. (2021), how to organize and structure DevOps teams remains a challenge. Hence, for an enhanced understanding of the optimal workforce allocation of such a DevOps team for sustainable quality delivery, the objective of this case study was to investigate the optimal DevOps workforce mix by considering the research question "*What is the optimal workforce allocation to enable sustainable quality delivery in a DevOps team*?". Since the workforce in an organization is not unlimited, the optimal staffing of teams becomes an organizational requirement (Marnewick and Langerman, 2020, López-Fernández et al., 2021). By understanding the optimal workforce allocation, organizations will be able to staff teams with an optimal balance between seniority, quality delivery, and operational costs.

The rest of this paper is structured as follows: In Section 2, we provide the background to this research paper, and in Section 3, we describe the research methodology. The data analysis and findings are discussed in Section 4, the contribution in Section 5, and Section 6 concludes the paper.

2. BACKGROUND

Software development, integration, deployment, and operational management require various and complex skill sets (Alawneh and Abbadi, 2022). Organizations would typically allocate dedicated teams to each of these skill sets and enforce the separation of duties according to the organizational structure. However, this separation of duties introduces several challenges, such as operational performance issues, lack of multiple rapidly timed software releases, and unforeseen security threats (Kuusinen et al., 2018). In this context, DevOps is a change in mindset for disjointed teams, enabling higher resilience, team elasticity, improved performance, and sped-up delivery processes (Alawneh and Abbadi, 2022).

2.1 Optimal workforce allocation

Software businesses are redirecting their expansion toward service-oriented business models (Sousa et al., 2015). Developers strive to enhance the systems, while simultaneously focusing their efforts on the fundamental concepts of collaboration, automation, and iteration (Duffy, 2015). While testing the systems, developers and operations teams learn from their previous code failures and problems. Based on the system feedback and recommendations, software developers and operations teams improve their level of performance quickly, which reduces the effort, budget and time required for deployment (Ogala, 2022). These quick cycles have been extended to incorporate a focus on automation and software tools for rapid deployment in lean-agile frameworks. By adopting the agile approach, emphasizing software integration, iteration, delivery, and deployment, the automation process enables teams to attend to designing optimal procedures (Ogala, 2022), achieving the development, deployment, infrastructure, operations, and monitoring of team members' work on various items of a software product (Alawneh and Abbadi, 2022). To deliver product-related services, these product-oriented teams must establish dedicated service units interfacing with customers (internal or external) and work closely with them (Dakkak et al., 2023). The optimal approach of control–alignment in product-oriented cross-functional teams is important, as neglecting one control part of interdependent work outputs would lead to misalignment (Wiedemann et al., 2019).

By integrating cross-functional teams, DevOps bridges functional silo software development and operations units accountable for planning, building, and running system processes and delivery lifecycles. Stability and quality of new software features, as well as faster time to market, are achieved by cross-functional teams through the integration of the operations and software planning phases (Wiedemann et al., 2019).

2.2 Sustainable Quality Delivery

DevOps as a concept is associated with both non-technical and technical practices (Lwakatare et al., 2019) and represents a potential answer to quality and time limitations in software development (Wiedemann et al., 2020). The purpose of DevOps is to increase the speed, quality and frequency of software delivery using automated procedures (Jha et al., 2023). Furthermore, product orientation for DevOps teams aims to achieve the balance between innovation and stability and between speed of delivery and quality (Liang, 2021; Sharma, 2017). To understand how DevOps teams achieve a high level of product orientation, the complexity of the product, level of quality delivery required, associated cost, and long-term sustainability of the team must be considered (Ebert et al., 2016). Consequentially, even though a DevOps team is controlled by a team leader, the team members are also required to manage themselves within the team, often supported by technology (Wiedemann et al., 2019).

Creating a DevOps culture poses a challenge due to the substantial adjustments required in work approaches and collaboration amidst contextual variations (Jha et al., 2023). In product organization, vertical divisions that are fully responsible must maintain self-contained operations throughout the entire lifecycle. This entails a diverse skill set accountable from concept to completion (Feijter et al., 2017). The role that encompasses the entire process involves constantly adjusting to evolving circumstances, such as shifts in customer needs, alterations in legislation, and the introduction of new technologies. Within a DevOps culture, there is a notable focus on ongoing enhancements to minimize inefficiencies, optimize speed, cost, and smooth handovers, and consistently elevate the quality of products and services. Consequently, experimentation stands as a crucial endeavor for integrating and fostering a learning-oriented approach by gaining insights from errors (Jha et al., 2023).

2.3 Stratified Systems Theory

This paper aims to identify a mechanism for optimal DevOps workforce allocation, enabling sustainable quality delivery. Scholars have investigated different approaches to optimal DevOps implementation. Hamzane and Khalyly (2021) investigated which IT governance methods informed the deployment of DevOps teams. However, this approach did not take cognizance of the appointed workforce's job roles and capabilities. Others investigated a specific yet narrow focus for DevOps implementation, such as the Internet of Things (López-Peña et al., 2020), cloud computing (Wettinger et al., 2016) or information management systems (Qumer Gill et al., 2018).

For this study, we utilized stratified systems theory (SST), defined by Elliott Jaques, as it provides a common classification system for various occupations (Jaques, 1986). SST offers a framework for understanding human capability and the cognitive processes required for individuals to plan and execute goal-directed activities bound by quality, time, and cost within levels of discretion that require judgment and intuition (Jaques, 2017). The foundation of SST is that, as individuals achieve varying points in cognitive power, they draw from different states of cognitive functioning, such as shaping, reflection, articulation, extrapolation, and transformation (Jaques, 2017). The interrelationship between cognitive power and cognitive functioning is depicted in Table 1 as seven hierarchical strata of increasing complexity of work that require greater abstractive capabilities.

Table 1 summarizes the seven strata of work, work complexity, cognitive mechanisms, work themes, and associated capabilities. The SST framework is particularly applicable to organizations with complex and stratified hierarchies through which they manage their workforce (Bezuidenhout et al., 2021, Törnblom et al., 2018).

Table 1. Hierarchical strata of increasing complexity of work (reproduced and adapted from (Jaques, 2017))

Stratum	Work complexity	Cognitive mechanism	Work theme	Capability
1	Perform one task at a time. Daily, weekly, and monthly quotas	Concrete shaping, concrete thinking, linear pathways	Quality	Cost Reduction (Touch and Feel)
2	Direct an aggregate of tasks. Diagnose problems	Reflective articulation, formulate new ideas, handle ambiguity	Service	Cost Control (Accumulation)
3	Direct one operating subsystem. Predict shorter-term needs	Linear extrapolation, alternate pathways	Practice	Cost Efficiency (Connecting)
4	Oversee operating subsystems. Design new methods and policies	Develop alternative systems, abstract from data, parallel processing	Strategic Development	Value Control (Modelling)
5	Command one complex system. Connections to environments	Shape and reshape whole systems, boundaries. Utilize theory	Strategic Intent	Value Creation (Weaving)
6	Oversee complex systems, groups of business units. Plan long-term strategy	Reflective articulation between systems. Higher conceptual approaches	Corporate Citizenship	Organizational viability (Revealing)
7	Construct complex systems. Construct versus predict future	Linear extrapolation. Develop new theories	Corporate Prescience	Industry shaping (Previewing)

3. MATERIALS AND METHODS

The organization where the case study was executed is a manufacturer of premium automobiles and a provider of mobility services. The case study organization is a worldwide digital transformation leader transforming its IT into fully agile and its DevOps into becoming more flexible, customer-centric, and value-driven. In addition, the case study organization also moved from projects to products and from bimodal IT to DevOps, ensuring complete collaboration and transparency between IT and the business. It has structured its IT portfolio around products and value streams and introduced new technologies to support microservice and cloud-based architectures to gradually replace its legacy monolithic applications. The case study organization supports open-source technology for its data ecosystem, which is key for portability, interoperability, interconnectivity, and data sovereignty (ARC Advisory Group, 2022).

The main objective of this case study was to identify a mechanism for optimal DevOps workforce allocation, enabling sustainable quality delivery. We achieved this outcome by following a design science research (DSR) approach and, in particular, the approach proposed by Hevner (2007) consisting of three cycles: the relevance cycle (contextual environment of the study presented in Section 2.1), the rigor cycle (extract relevant knowledge base of scientific foundations, experience, and expertise that informs the research project highlighted in Section 2.2) and the design cycle (Hevner, 2007). The design cycle iterates between the core activities of building and evaluating the design artifacts and processes of the research. For the design cycle, we followed the processes suggested by Frey and Osborne (2017) and Bezuidenhout et al. (2021) that combined the classification of occupations based on strata of work with a predictive model. Specifically, we executed two design (build) steps: (1) define drivers of the case organization's occupations and (2) define the case organization's DevOps occupation labels and consequential generic DevOps workforce mix profile. For the evaluation step, we analyzed workforce human resources data (HRD) and compared it to the design. The research approach we followed is visualized in Figure 1.

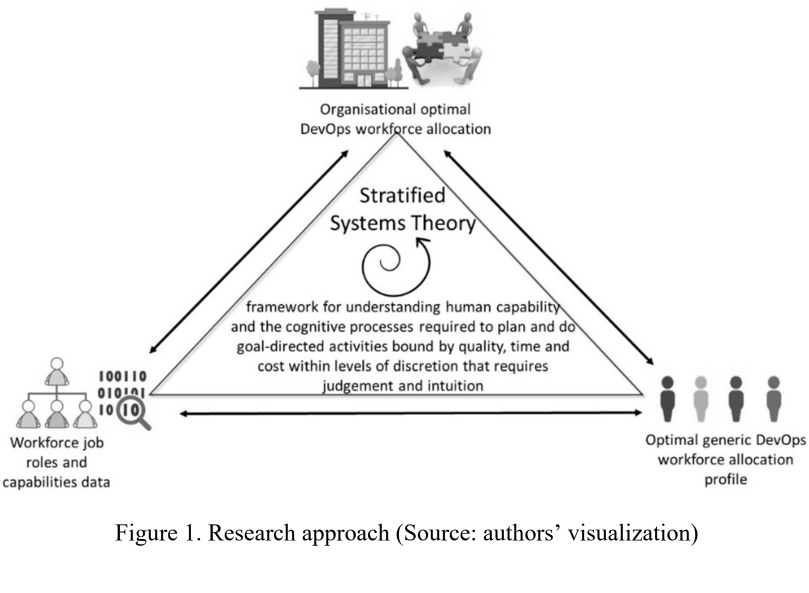


Figure 1. Research approach (Source: authors' visualization)

Figure 1 also emphasizes the interrelationship among optimal DevOps workforce mix allocation, skills, and competencies, as well as job roles to which employees are appointed and the generic DevOps workforce mix profile. The organization wishes to optimize deployment time, budget, and effort and appoint employees in organizational structures and job roles to achieve organizational outcomes. Simultaneously, the organization requires an optimal DevOps workforce mix to achieve the desired organizational outcomes. Finally, employees, together with their job roles and capabilities, are allocated to the optimal generic DevOps workforce mix profiles. For these interrelationships to be made explicit and manageable, the SST is applied, as shown in the center of Figure 1, to create a common language among these three aspects and enable mapping among the entities.

3.1 Drivers of the Case Organization's Workforce Mix

The case study organization applies drivers of the workforce mix. The aim of the workforce mix was to balance cost optimization, skills retention, and high-quality delivery. The drivers of the workforce mix include complexity (the complexity of the product), process knowledge (associated with the product), network (refers to the size of the network required to get the work done), criticality (the unavailability of the DevOps product in time has a severe impact on the organization's performance, e.g., impact on the start of production, sales, finances), and maturity level (high maturity as a product or low maturity). In addition, a particular weight, as determined by the case study organization, was allocated to each driver, summarized in Table 2. The weight allocation aligns with the process executed by Karemera and Ngubiri (2012) and Malik and Bilberg (2019) (human–robot collaborative assembly), whereby allocation is based on tasks and actors that are not necessarily homogeneous, and the allocation ceilings are based on weights rather than numbers.

Table 2. Drivers and associated weighting of workforce mix of DevOps team
(Source: case study organization)

Driver	Driver of workforce mix	Associated weighting of drivers per DevOps team
1	complexity	25%
2	process knowledge	20%
3	network	10%
4	criticality	25%
5	maturity level	20%

The complexity and criticality of the product under development carry the highest weight of 25% since the more complex and critical the product is, the more time and resources it would require to design, develop, test, and implement. This investment in time and resources can be a significant challenge for the case study organization as it implements its IT strategy and manages ever-growing customer demands.

3.2 Definition of Case Organization's Devops Occupation Label

To determine the optimal workforce mix for the DevOps development teams of the case study organization, the SST strata (refer to Section 2.3 and Table 1) were applied to determine the occupation that should form part of a DevOps team, as the SST strata provide a common classification system for various job roles. The advantage of mapping the case study organization occupations to a common classification system is that any job role (e.g., system engineer, solution architect, agile master, product manager, etc.) is associated with a particular SST stratum, and it provides the common ground for job analysis, pay grade association, accountability, and seniority.

The proposed mapping of the SST strata to the case study organization's DevOps team occupations is shown in Table 3. The mapping was based on matching the SST stratum definition (Table 1) with the case study organization's occupation definitions.

Table 3. Mapping of case study organization's DevOps occupations to SST strata

SST Stratum	SST Work theme	Case study organizations DevOps team occupation label and years of experience	
1	Quality	Entry level	0–2 years' experience
2	Service	Advanced level	3–4 years' experience
3	Practice	Senior level	5–10 years' experience
4	Strategic Development	Expert level	10+ years' experience
5	Strategic Intent	Chief expert	deep level of expertise and knowledge
6	Corporate Citizenship	Not applicable	Not applicable
7	Corporate Prescience	Not applicable	Not applicable

In terms of the DevOps team occupation label mapping for the case study organization, the first five SST levels, i.e., cost reduction, cost control, cost efficiency, value control, and value creation, were mapped since these strata aligned to the case study organization's product-based and business line transformation. Strata 6 and 7, i.e., organizational viability and industry-shaping, were not relevant and were marked "Not applicable" for the DevOps team occupation labels of the case study organizations, as the work complexity for these two strata related to long-term planning for a group of business units and prediction of the future.

The associated occupation label assigned to each workforce mix was based on several scenarios considered by the case study organization. If a DevOps team is too junior, then such a team might not have the expertise to deliver high-quality, complex products as opposed to teams that are too senior, pointing to ineffective use of company resources. Furthermore, teams that are too senior might not build enough long-term skills for the team to be sustainable, or having a senior team close to retirement might place long-term product delivery at risk.

To determine typical DevOps workforce mix profiles (i.e., based on DevOps team occupation labels related to SST as defined in Table 3), 32 managers of product lines in the case study organization were invited to rate their product lines using a three-point scale: 1 (low), 2 (medium) and 3 (high). We combined Tables 2 and 3 as data collection instruments shown in Table 4. Each product line manager considered the drivers of the workforce mix for their particular product lines and rated them accordingly.

Table 4. Data collection instrument (Source: case study organization)

Drivers of workforce mix		**Entry level**	**Advanced level**	**Senior level**	**Expert level**	**Chief expert**
complexity	25%	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3
process	20%	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3
knowledge network	10%	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3
criticality	25%	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3
maturity level	20%	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3

We calculated the score based on the driver weight and the rating captured by the participating managers. The purpose of this data collection was to establish generic profiles of DevOps teams, suggesting an ideal mix of the workforce based on the drivers of the workforce mix. We applied SST to establish an ideal profile mix, and based on the calculated score per DevOps team occupation Level, three generic (ideal) profiles were identified, as shown in Figure 2.

High: Score 2.5–3.0 | Medium: Score 1.9–2.4 | Low: Score 1.0–1.8

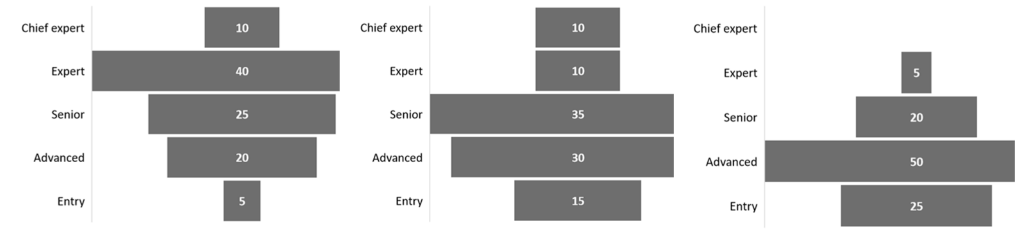


Figure 2. Profiles of DevOps team workforce mix based on SST (Source: authors' visualization)

Scores of 1.0 to 1.8 were denoted a Low DevOps profile, where 25% of the team consisted of entry-level employees, 50% advanced-level employees, 20% senior-level employees, and 5% expert-level employees (Figure 1). For the Low DevOps profile mix, no chief expert-level employees were allocated to the DevOps workforce allocation, as the SST work theme and strategic intent were not relevant in this instance nor required by the complexity of the product line. A Medium DevOps profile was defined for a score of 1.9 to 2.4, where 15% of the team consisted of entry-level employees, 30% advanced-level employees, 35% senior-level employees, and 10% expert and chief expert-level employees, respectively (Figure 1). Finally, for scores of 2.5 to 3.0, a High DevOps profile was defined by combining 5% of entry-level employees, 20% advanced-level employees, 25% senior-level employees, and 40% expert and 10% chief expert-level employees (Figure 1). From the visualization presented in Figure 2, it can be observed that the SST work theme (DevOps team occupation label) increases in importance as the complexity of the drivers of the workforce mix increases.

Therefore, the three DevOps workforce mix profiles depicted in Figure 2 represent generic profiles associated with low, medium, and high complexity product lines and provide a basis for the data analysis phase of this research study, Step 3 in our design process, discussed in the next section.

3.3 Key Considerations and Ranking from Product Line Owners

Finally, in order to enrich the suggested workforce allocation method and propose a set of repeatable guidelines to enhance organizations' understanding of the over- and under-representation of DevOps workforce mix allocation, we designed an on-line questionnaire consisting of two sections. The first part of the questionnaire collected key considerations qualitative data for each of the drivers of workforce mix. This free text data was analyzed by applying thematic analysis involving recognizing, examining, and communicating patterns (themes) within data (Castleberry and Nolen, 2018). The second part of the questionnaire required that the product line owners rank the drivers of workforce mix from 1 (most important) to 5 (least important). We collected qualitative data from 17 product line owners in the case study organization to identify the key considerations they apply when allocating actual workforce. The product line owners received the link to the questionnaire via email and after consenting to share their views, they captured their comments.

4. DATA ANALYSIS AND FINDINGS

Employee data and team occupation labels (Table 3) are held in the human resource system (HRS) of the case study organization. DevOps team data were extracted from the HRS and grouped per their allocation to different product lines. For each product line, the actual allocation of the workforce mix could be determined and compared to the generic profiles designed, as shown in Figure 3.

In Figure 3, the actual DevOps workforce mix extracted from the case study organization's HRS is shown as a bar graph, while the generic profiles designed (Figure 2) are shown as a line graph. The overlayed profiles are presented for a high, medium, and low DevOps workforce mix, and the product lines were coded with alphabetic labels so as not to compromise the case study organization.

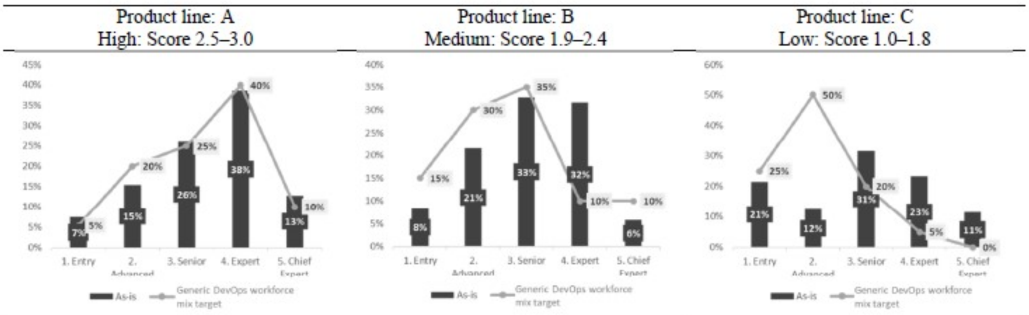


Figure 3. Actual DevOps team workforce mix compared to generic (ideal) profiles designed (Source: authors' visualization)

By comparing the actual DevOps workforce mix to the desired workforce mix, the DevOps workforce mix for Product Line C indicates that higher SST work theme levels are allocated (senior, 31% actual vs. 20% required; expert, 23% actual vs. 5% required; and chief expert, 11%

vs. 0% required) as opposed to the required profile of 50% occupied by 12% of the actual employees. By comparing the actual DevOps workforce mix to the generic (required) DevOps workforce mix, the case study organizations could normalize teams and ensure that the competence and skill required to deliver the particular product line are addressed optimally.

Table 5 presents the thematic analysis for each of the workforce drivers as provided by the product line owners. These key considerations afford more granularity to the workforce drivers and may be contextualized to the organization applying this approach towards achieving optimal workforce mix allocation of DevOps teams. Furthermore, the relative weighting of the drivers for the seniority mix (Table 4) reflects the organization's perception of the managers and should also be considered in the respective organizations.

Table 5. Thematic analysis of product line owner key considerations per workforce driver (Source: case study organization)

Drivers of workforce mix	Key considerations based on the qualitative data obtained from 17 product line owners	
Complexity	• Technical proficiency and skill evaluation • Team composition and stability • System complexity and impact analysis • Staffing and role distribution	• Future roadmap and complexity • Knowledge and experience requirements • Personal attributes and team dynamics
Process knowledge	• Industry and process knowledge • Experience and expertise requirements • Knowledge transfer and team composition	• System functionality and impact analysis • Ownership and business alignment • Communication and compliance
Network	• Network and relationship building • Communication and cultural fit • Cross-departmental collaboration • Language and cultural considerations	• Stakeholder engagement and influence • Dependency identification and problem-solving skills
Criticality	• Criticality and impact assessment • Operational support and skill requirements • Business and production impact • Technical expertise and proactive maintenance	• Risk management and service level agreement compliance • Communication and problem-solving skills
Maturity level	• Balancing seniority and risk • Lifecycle phase and team setup • Product stability and operational mode • Skills and expertise requirements	• Adaptation to product complexity • Strategic alignment and individual development • Assessment of candidate skills

N=17

Figure 4 depicts the drivers of workforce mix as ranked by die 17 product line owners in the case study organization. According to the product line owners, *complexity* and *criticality* are the most important drivers that they consider when allocating actual workforce to their DevOps teams. *Network* is ranked the least important compared to the other workforce mix drivers. The ranking by the product line managers provides a means of prioritizing DevOps workforce mix allocation, especially when sequencing of product line development is required or when workforce allocation clashes are experienced.

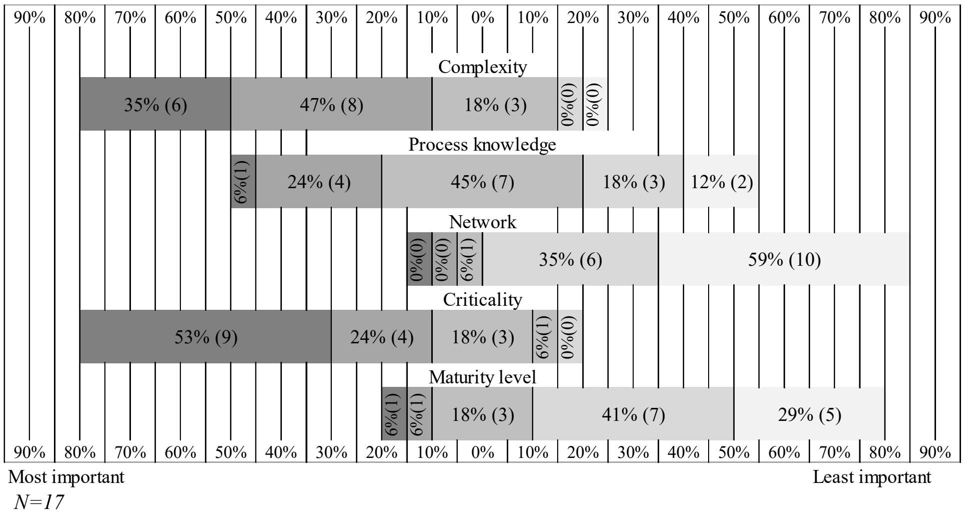


Figure 4. Ranked drivers of workforce mix (Source: authors' visualization)

5. GUIDELINES AND CONTRIBUTION

The main aim of this case study was to define a mechanism for optimal DevOps workforce allocation to enable sustainable quality delivery. As organizations have different organizational structures with their associated job profiles, the constitution of DevOps teams will reflect these different views. By applying SST that provides a common classification system for various occupations (Jaques, 1986), thereby creating a common language (Figure 1) between the required DevOps workforce mix and the actual DevOps workforce mix, the gap between the requirement and reality can be determined, and once identified, the gap could be addressed.

This DSR study contributes to both practice (the rigor cycle defined by (Hevner, 2007) in Section 3) and the body of knowledge on the subject of the optimal allocation of the DevOps workforce mix (the relevance cycle defined by (Hevner, 2007) in Section 3).

5.1 Contribution to the body of knowledge

We achieved the objective of this DSR study by executing a particular approach (presented in Figure 5) in a case study organization by suggesting particular repeatable guidelines.

STEP 1

Use the key considerations to customize the workforce mix drivers for the particular organization.

Drivers of workforce mix	Key considerations based on the qualitative data obtained from 17 product line owners	
complexity	• Technical proficiency and skill evaluation • Team composition and stability • System complexity and impact analysis • Staffing and role distribution	• Future roadmap and complexity • Knowledge and experience requirements • Personal attributes and team dynamics
process knowledge	• Industry and process knowledge • Experience and expertise requirements • Knowledge transfer and team composition	• System functionality and impact analysis • Ownership and business alignment • Communication and compliance
network	• Network and relationship building • Communication and cultural fit • Cross-departmental collaboration • Language and cultural considerations	• Stakeholder engagement and influence • Dependency identification and problem-solving skills

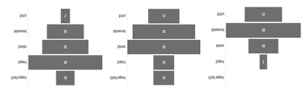
STEP 2

Map SST Work theme to the organization's DevOps team occupation labels

SST Stratum	SST Work theme	DevOps team occupation label	
1	Quality	Entry level	0-2 years' experience
2	Service	Advanced level	3-4 years' experience
3	Practice	Senior level	5-10 years' experience
4	Strategic Development	Expert level	10+ years' experience
5	Strategic Intent	Chief expert	deep level of expertise and knowledge
6	Corporate Citizenship	Not applicable	
7	Corporate Prescience	Not applicable	

STEP 3

Create the generic (ideal) DevOps team workforce mix based on the workforce mix drivers

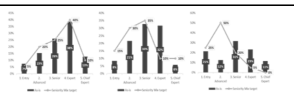


STEP 4

Extract HRS data of actual employee allocation

STEP 5

Compare generic to actual DevOps profile mixes



STEP 6

Analyze the gap and implement an action plan to address over- or under-representation

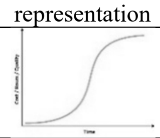


Figure 5. Proposed guidelines for determining and optimizing the DevOPs workforce mix
(Source: authors' visualization)

This research study suggested guidelines for determining and optimizing the DevOps workforce mix. This was achieved by creating a common language based on SST to define an organization's requirement for an optimal generic DevOps workforce mix. Where no workforce mix drivers are established, the key considerations (Table 5) and the workforce driver ranking (Figure 4) may be applied to customize workforce mix drivers for an organization (Step 1). Organizational roles must be mapped to the SST work themes (Step 2), whereafter, we propose a mechanism to, with input from product and service managers, create the required DevOps workforce mix (Step 3). Once defined, the actual employee data can be extracted from the HRS (Step 4), enabling the comparison of the as-is workforce allocation to the required DevOps workforce mix (Step 5). The difference between the actual and the required DevOps workforce mix profiles can be assessed, and strategies can be implemented to address over- and under-representation toward optimizing time, quality, and cost (Step 6).

5.2 Practical Contribution

From a practical perspective, the guidelines described in Section 5.1 were executed in a case study organization, resulting in key inputs in terms of its DevOps workforce allocation strategy. In particular, it assisted the case study organization (as far as product line ownership is concerned) in managing the increased accountability and responsibility of High DevOps profile product lines with the skills of its employees. Furthermore, the analysis informed cost reprioritization based on product line ownership. Finally, strategic decisions could be made regarding investment in young talent and talent access relationships.

By applying the guidelines for optimal DevOps workforce mix allocation, organizations will be able to allocate employees to product-line delivery with an optimal balance between seniority, complexity, quality delivery, and operational costs (staff and timed delivery).

6. CONCLUSION

The main aim of this case study was to identify a mechanism for optimal DevOps workforce allocation, enabling sustainable quality delivery. This objective was achieved through a DSR research approach, applying SST as a common language to create a generic DevOps workforce mix profile for the case study organization. The DevOps workforce mix profile was established for low-, medium- and high-complexity product lines and incorporated different SST strata related to case study organization DevOps team occupation labels.

With the generic DevOps workforce mix profiles defined, the actual HRM data of employees allocated to the DevOps teams were extracted, mapped to the SST strata, and compared to the generic profile designed. By comparing the desired DevOps workforce mix to the actual workforce mix, the case study organization can manage the DevOps workforce mix as the gap between the desired and actual workforce mix provides a basis for optimization. This optimization informs the talent management and recruitment strategies and optimizes human resources cost. By allocating the DevOps workforce mix according to the desired DevOps workforce mix profiles, the case study organization can ensure that the correct combination of roles can deal with all complexities of the product line development.

We acknowledge that the generic DevOps workforce mix designs are somewhat coarse (high, medium, and low); this could be refined in terms of future research. As the drivers of the workforce mix (Table 1) are context-sensitive, future research could develop guidelines for organizations to define and weigh these drivers as a key input to the generic DevOps workforce mix model. The case study organization has a well-defined organizational structure and job roles, and further research would be required to generalize our proposed guidelines (Figure 5) in an environment where these structures are more fluid.

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