

ENHANCING ORGANIZATIONAL STRUCTURE IN ELECTRONICS SERVICE COMPANIES: A CASE STUDY OF PRIMA SERVICE RECOMMENDATION USING HIERARCHICAL CLUSTER ANALYSIS

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Abstract: This research aims to: (1) identify organizational inefficiencies at Prima Service, an electronics repair company with over 20 years of experience; (2) design a structured organizational framework to enhance operational performance; (3) establish clear roles and responsibilities through detailed job descriptions; and (4) standardize work processes with comprehensive operating procedures. Prima Service, based in Jakarta and Bekasi, provides repair services, maintenance processes, and product sales to both consumers and business clients. Despite its long-standing presence, the company faces challenges in Planning, Organizing, Actuating, and Controlling (POAC), including dual roles of the owner, lack of a standardized organizational structure, and undefined job descriptions. Using the Hierarchical Cluster Analysis method, with the average linkage dendrogram as a foundation, the study proposes an optimized organizational structure. Data collection involved direct observation and employee interviews to ensure alignment with operational needs. The resulting structure consists of five departments, supported by detailed job descriptions and standardized procedures. This research provides a practical model for addressing organizational challenges, improving efficiency, and supporting sustainable growth.

Keywords: POAC, Organization Structure, Hierarchical Cluster Analysis, Job Description

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1. Introduction

Competitive business landscape, organizational structure plays a pivotal role in ensuring the efficient and effective management of resources, directly influencing a company's ability to succeed. A well-designed organizational structure not only streamlines day-to-day operations but also clarifies roles and responsibilities, enhances communication across various departments, and creates a solid foundation for scalability. According to McKinsey & Company (2020), companies with structured management systems are 30% more likely to achieve operational efficiency and sustain long-term growth. The importance of a clear organizational design becomes even more pronounced in service-oriented businesses, where consistent performance and high levels of customer satisfaction depend heavily on well-coordinated internal processes and seamless communication (Richard Daft L, 2018).

Prima Service, an electronics repair service company based in the Jakarta-Bekasi region, exemplifies these challenges and opportunities. As a small and medium enterprise (SME) with

over two decades of operational experience, it has grown to accommodate almost average 53 employees at its peak. However, despite its longevity and market presence, the company continues to grapple with a high employee turnover rate, which has impacted its operational efficiency and service quality. The turnover rate, as shown in Table 1, reflects a growing concern for the management, highlighting the need for a more adaptive and resilient organizational structure to maintain performance standards and customer satisfaction amidst these internal challenges.

Table 1. High Turnover Rate Data at Prima Service in 2022

Month	Current Employee	Employee In	Employee Out	Turnover Presentation
Januari	33	0	1	3.03%
Februari	32	1	0	0.00%
Maret	33	0	2	6.06%
April	31	0	0	0.00%
Mei	31	1	0	0.00%
Juni	32	0	0	0.00%
Juli	32	0	2	6.25%
Agustus	30	2	1	3.33%
September	31	0	0	0.00%
Oktober	31	2	0	0.00%
November	33	0	2	6.06%
Desember	31	2	1	3.23%
TOTAL (FY 2022)	-	8	9	29.03%

From Table 1, it can be observed that Prima Service's turnover ratio data throughout 2022 reveals a total of 13 employees leaving the company, with the highest turnover ratio recorded in July (6.25%), and an annual 2022 turnover rate of 29.03%. According to the Society for Human Resource Management (SHRM), a turnover rate exceeding 10% per year is considered high and can cause significant operational challenges (Hom et al., 2017). This aligns with Prima Service, which also faces operational difficulties due to its high turnover rate. An analysis of the issue was conducted to address the impact of turnover on Prima Service's operations. Interviews were carried out using a sampling method with the company owner and 15 employees. The results revealed that the majority of employees expressed dissatisfaction with unclear task assignments and job overlap.

The analysis uncovered that Prima Service lacks a clearly defined organizational structure and proper job distribution, which directly affects employee satisfaction and contributes to the turnover rate, ultimately causing operational challenges. According to Mintzberg (2019) from the Harvard Business Review, an effective organizational structure organizes task distribution to ensure coordination and synergy between departments, reduces task overlaps, and improves operational efficiency. In the case of Prima Service, the internal issue of an undefined organizational structure and ambiguous task assignments presents a critical challenge. This study maps the current operational job allocation and suggests an approach for a proposed organizational structure.

The purpose of this research is to map the work processes of Prima Service in relation to all of its employees and propose improvements in job allocation and organizational structure. The expected outcome is that the proposed structure will enhance the overall work

environment, which in turn will positively impact the operational processes of Prima Service based on an evaluation of the current conditions.

2. Literature Review

The method used in this research is Hierarchical Cluster Analysis, employing the average linkage dendrogram technique to analyse operational processes and design a proposed organizational structure for Prima Service. Hierarchical Cluster Analysis is an effective method for grouping objects based on attribute similarities. The average linkage technique, which measures the average distance between groups, provides a more balanced solution compared to other methods like single or complete linkage. This is particularly suitable for designing organizational structures, as it helps create an equitable and efficient division of tasks across departments (Larose, 2014).

The average linkage method avoids the extremities associated with single linkage (which tends to group data based on the most similar members) or complete linkage (based on the most dissimilar members), making it more stable and flexible for companies like Prima Service, which require an efficient organizational structure. Data collection for Prima Service also incorporated a combination of quantitative methods, such as dendrogram calculations, and qualitative methods, through interviews. By applying this method, the research aims to produce an accurate and tailored organizational structure proposal that aligns with the specific needs and conditions of Prima Service.

There are some studies present diverse applications of hierarchical clustering and dendrogram analysis to solve organizational and operational challenges. Smith et al. (2021) applied hierarchical clustering with divisive methods, such as k-means, to optimize production processes in manufacturing firms. Their approach helped segment activities more effectively, improving resource management and decision-making through clustering. Brown & Wilson (2018) used agglomerative hierarchical clustering in technology firms to address departmental inefficiencies. By clustering based on task similarities, they uncovered patterns that facilitated collaboration and reduced redundancy across departments. Zhang & Li (2016) employed Ward's method of hierarchical clustering to reorganize regional electronics repair hubs. Their work focused on grouping operational units by geographical and functional proximity, improving communication and resource allocation across centres.

The development of previous research of operational and organizational process restructuring studies that are using hierarchical clustering and integrated with other methods is presented in the State of the Art (SOTA) in Table 1.

Table 2. State of The Art (SOTA)

Previous Research	Unit of Analysis	Methods	Novelty
Smith et al. (2021)	Automotive service and maintenance companies	Hierarchical Clustering, Dendrogram Analysis	Focus on optimizing production processes
Previous Research	Unit of Analysis	Methods	Novelty
Lee & Park (2020)	Regional electronics repair hubs	Average Linkage Clustering, Organizational Design Models	Applicable to SMEs, lacks comprehensive job role definitions

Martinez & Gomez (2019)	Health care service organizations	Multivariate Hierarchical Clustering	Emphasizes large-scale organizational restructuring
Brown & Wilson (2018)	Technology-based firms	Hierarchical Agglomerative Clustering	Focus on technological operations
Kumar & Singh (2017)	Automotive service and maintenance companies	Dendrogram and Cluster Analysis	Industry-specific, lacks adaptability for small firms
Zhang & Li (2016)	Regional electronics repair hubs	Ward's Method in Hierarchical Clustering	Regional perspective, no focus on job structuring
Johnson & Reed (2015)	Health care service organizations	Single Linkage Clustering	Limited to health care, focuses on patient services
This Research (2024)	Electronics repair service Prima Service	Hierarchical Cluster Analysis, Average Linkage Dendrogram	Focus on operational restructuring in a mid-sized electronics repair firm, providing clear role definitions, job descriptions, and improving management efficiency through functional reorganization. Novel application of hierarchical methods in a mid-sized service-oriented business

Table 2 shows the findings of the previous research that analyze a service quality which are basically using the hierarchical clustering method. Table 1 also shows the positioning methodology and novelty of this research compared with other previous study. There are various units of analysis and methods done for improving operational process and organizational structure.

The slight differences between this research and previous research in both methodology and unit of analysis. Methodologically, while majority previous studies utilize hierarchical clustering with divisive or agglomerative methods, this research integrates average linkage and dendrogram analysis specifically tailored to mid-sized electronics repair firms. Additionally, Ward's method used in previous research focuses on geographical clustering, whereas this research emphasizes functional reorganization and clear job role considerations, which many of these studies lack. In terms of unit of analysis, prior studies target broader sectors like manufacturing or technology firms, but this research is distinct in concentrating on a service-oriented, mid-sized electronics company, providing a more specific operational and managerial focus.

3. Research Method

This research begins with field observations and interviews with key personnel at Prima Service, including the owner, secretary, technicians, and marketing team (Sugiyono & Sutopo, 2017). The initial data collection aimed to understand the company's current processes and organizational structure, identifying inefficiencies such as overlapping roles and an overburdened owner, who handles tasks across multiple departments. Employee turnover is often driven by dissatisfaction with role clarity and workload distribution, both of which negatively impact operational performance. The analysis of the turnover rate revealed that the main root cause of the problem was employees taking on multiple roles, which contributed to operational inefficiencies (Hom et al., 2017).

To further investigate the root cause, a detailed analysis of the current work processes was conducted using business process mapping, a tool that provides a visual representation of workflows, enabling organizations to identify inefficiencies and enhance operational efficiency (Nishadha, 2024). Tools like swimlane diagrams were employed to visually represent workflows and the relationships between various roles. This step clarified how different departments interacted, highlighted communication gaps, and quantified the time required for each task. Business process mapping is particularly effective in identifying operational bottlenecks and inefficiencies. The business process maps exposed inefficiencies, such as unclear job descriptions and the owner's over-involvement in both technical and marketing functions, which disrupted the overall workflow. Consequently, the research proposes a reorganization of business processes and activities based on the identified issues and challenges.

At the core of the methodology is the use of hierarchical clustering with the average linkage method. Hierarchical Cluster Analysis is a robust method for grouping similar job functions based on their attributes and interactions, a technique commonly applied in organizational design studies (Larose, 2014). The average linkage technique avoids the extremes of single or complete linkage, offering a more balanced solution for determining task groupings, which is particularly useful for designing organizational structures. The analysis helped identify logical clusters of responsibilities by cutting clusters at an appropriate similarity range according to the company's needs. This enabled a more efficient distribution of tasks and suggested a refined organizational structure for the company.

Based on the clustering analysis, this research proposed an organizational redesign that formalized job descriptions and redistributed responsibilities to reduce role ambiguity and operational delays. Research shows that formalized job descriptions and clear reporting lines enhance accountability and reduce the strain on leadership by delegating tasks more effectively (Mintzberg, 2019). The new structure aims to alleviate the owner's workload and enhance accountability across the company. By establishing clearer reporting lines and refining the division of labour, this proposed structure is designed to improve overall operational efficiency at Prima Service.

4. Result and Discussion

4.1 Result

Currently, Prima Service does not have an officially implemented organizational structure. Therefore, an analysis will be conducted based on the entire business process, which includes finance, human resource, service repair and maintenance, marketing and sales, design and documentation, customer relations, and logistics processes. One of the key processes at Prima

Service is the end-to-end service & repair process for customers, with the actors involved in the process illustrated in Figure 1.

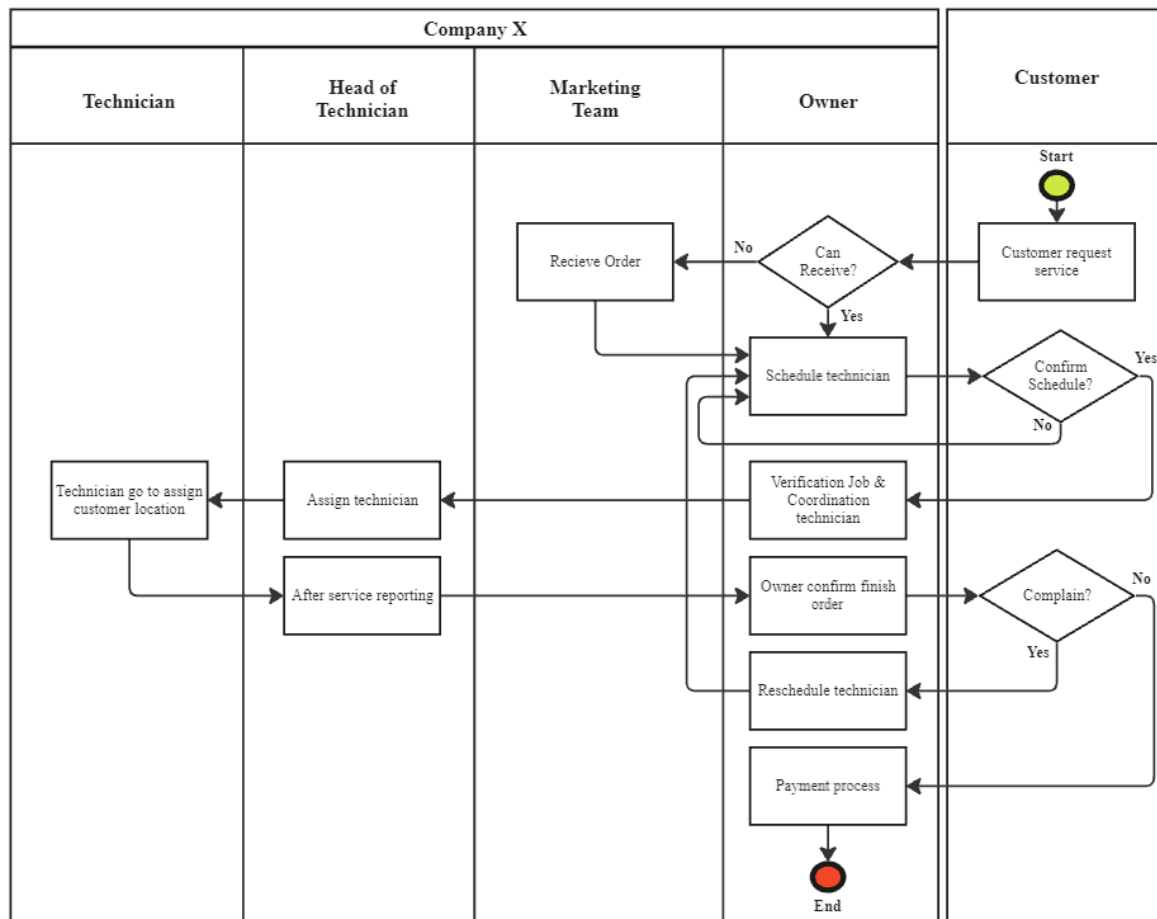


Figure 1. Swimlane Diagram for Service Process

As shown in Figure 1, there is a noticeable overlap of responsibilities, with the owner managing a wide range of activities across different departments. This overlap highlights the potential for inefficiencies, as several of these tasks could be delegated and redistributed to other individuals within Prima Service’s business processes. By doing so, the workflow could be made more efficient, and the burden on the owner could be reduced. Following a series of interviews and direct observations, a detailed review of all business processes, their associated activities, and responsible actors was conducted. Based on this analysis, additional activities were identified, and a more structured partitioning of the business processes was proposed to ensure a more streamlined and efficient workflow, as depicted in Figure 1.

Table 3. Proposes Business Process with Activity and Subject

Business Process No	Activity	Subject
Finance	1 Recapitulation of Income	Finance
	2 Recapitulation of Expenditure	Finance
	3 Creating Department Budgeting Reports	Finance
	4 Creating Financial Reports	Finance & Director
	5 Employee Reimbursement	Finance/Assistant

	6	Payroll System Management	Finance
	7	Payment Receipts	Finance
Human Resource	8	Employee Recruitment Process	HR Staff, Director
	9	Employee Training Process	Chief Technician
	10	Employee Selection Process	Director & Chief Technician
	11	Employee Insurance Management	Assistant
	12	Technician Work Schedule Management	Chief Technician
	13	Employee Salary Distribution Management	HR Staff
Service & Repair	14	Service Maintenance for Customers	Technician
	15	Service Repair for Customers	Technician
	16	Consultation on Issues	Chief Technician
Marketing	17	Brainstorming	Marketing
	18	Sales	Marketing
	19	Creating Quotation Letters	Marketing
	20	Advertising Planning	Marketing
	21	Approval of Ads/Quotations	Director
Business Process	No	Activity	Subject
Design & Documentation	22	Collecting Materials for Design	Design Team
	23	Creating Designs for Marketing	Design Team
	24	Storing & Managing Work Documentation	Design Team
Customer Relations	25	Receiving Customer Complaints	PR Staff
	26	Receiving Customer Orders	PR Staff
	27	Payment Receipts	PR Staff
Logistics	28	Recording and Monitoring Company Assets	Logistics Staff
	29	Performing Asset Replacement	Logistics Staff
	30	Purchasing Spare Parts	Logistics Staff

Source: Prima Service root cause analysis from interview and field study

Based on the analysis of Prima Service's business processes, several new activities have been introduced to address the core operational challenges identified during the initial evaluation. One significant addition is the implementation of payroll system management and employee salary distribution management. These activities are designed to resolve the company's recurring payroll issues, which have previously led to operational inefficiencies and employee dissatisfaction. By formalizing these processes, Prima Service can ensure smoother payroll operations and reduce the administrative burden on existing staff.

In addition, the inclusion of a sales/purchasing process addresses the issue of role overlap, particularly the owner's involvement in managing sales orders. Previously, the owner was responsible for accepting orders, leading to an overextension of their responsibilities. This newly introduced process will streamline the order acceptance procedure and ensure that these tasks are handled more efficiently by designated personnel, allowing the owner to focus on higher-level strategic decision-making.

Several other business processes have also been revised and expanded that marked with yellow highlight (■). A design and documentation process, with three new activities (22, 23, 24), has been created to manage design tasks separately from marketing. This helps in organizing internal and marketing-related design work more efficiently. Similarly, a customer relations process with three activities (25, 26, 27) has been added to centralize the handling of complaints, order receipts, and payments, previously managed by the owner. Lastly, the establishment of a logistics process, with three activities (28, 29, 30), addresses the management of equipment and spare parts, tasks that were previously handled by technicians. This separation ensures that technical staff can focus on their core responsibilities, leading to a more organized and efficient workflow within Prima Service.

Following the revised activity list that has been proposed, the next step will involve connecting all activities based on the flow of information between the mapped and proposed business process activities. This connection is established through the business process mapping derived from direct observations and interviews conducted at Prima Service. The resulting connections and flow will be illustrated using the diagram provided below at figure 2.

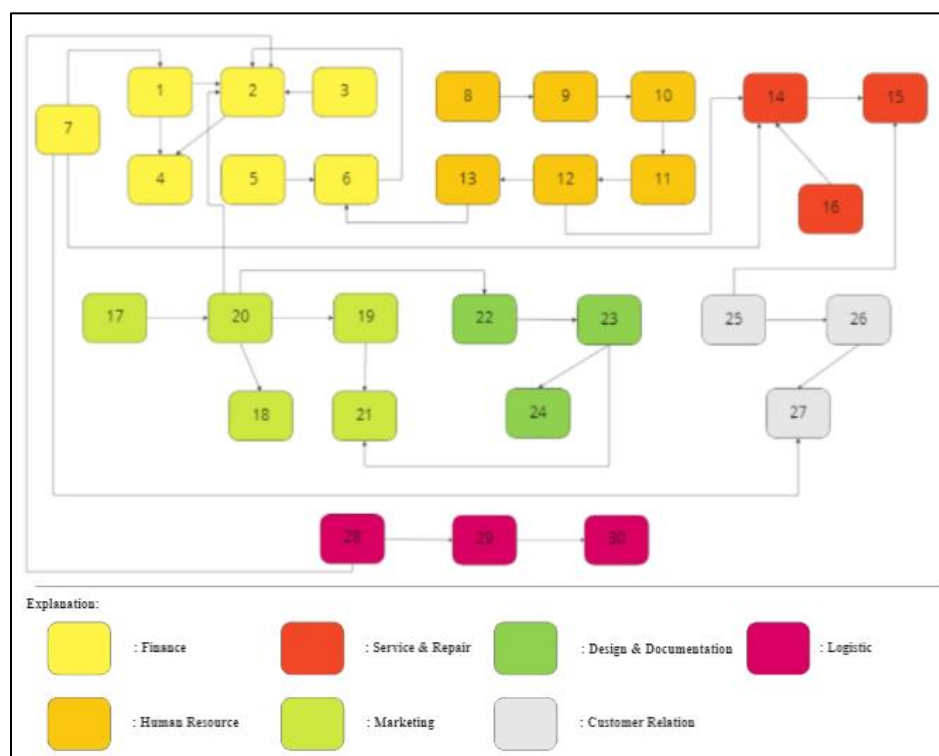


Figure 2. Combined DFD

Based on the data flow recapitulation, a distance matrix was developed to assess the proposed business processes for Prima Service. This matrix was constructed by assigning proximity scores ranging from 1 to 5, which are detailed in the activity proximity matrix table. The scoring criteria are as follows: Score 1 is assigned when two activities are directly consecutive in sequence, score 2 is given when there is one intervening activity between them, score 3 when there is a gap of two activities, score 4 for a gap of three activities, and score 5 when four or more activities separate them in the process flow. This proximity scoring allows

for a structured evaluation of the relationships between business activities, facilitating the subsequent analysis required for organizational restructuring (Larose, 2014).

Subsequently, a dendrogram will be constructed using the average linkage method based on the proximity matrix. This matrix is developed from the identified business processes, and the dendrogram will be generated using Minitab software. The results can be observed in Figure 3.

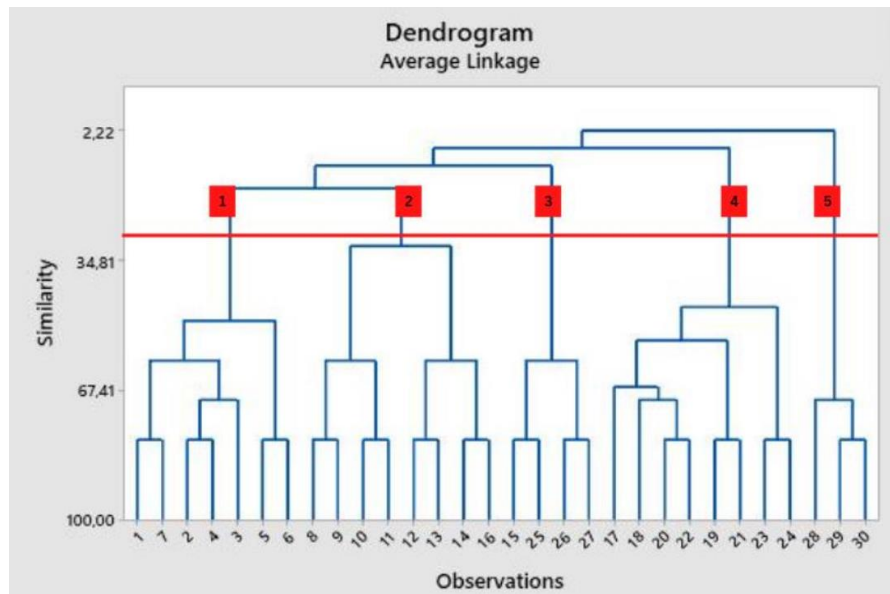


Figure 3. Dendrogram Using Average Linkage Method

The clustering performed in Figure 3 was executed using the average linkage method, which was determined to be the most appropriate for Prima Service's operational structure. The analysis revealed five distinct clusters or activity groups. The first cluster, Finance, remained the same as before, focused entirely on financial operations. The second cluster combined human resource and service repair, which were previously treated as separate business processes but are now grouped together due to their operational synergy.

The third cluster pertains to Customer Relations, which retains its original name. However, one activity from the Service Repair process has been reassigned to the Customer Relations cluster, emphasizing its strong connection to customer-facing operations. The fourth cluster merges Marketing with Design Documentation, previously two distinct business processes. These were combined due to a high degree of interrelated activities, aligning them more closely to enhance coordination. Finally, the last cluster remains Logistics, which continues as a standalone business process without merging with other processes or activities. These five clusters serve as the basis for the proposed organizational structure of Prima Service, which aims to address the company's operational challenges and resolve core issues related to its current workflow inefficiencies.

4.2 Discussion

This research follows a systematic approach to addressing operational inefficiencies and organizational challenges at Prima Service, an electronics repair company. The study begins by identifying inefficiencies that shown on table 1 and progresses towards designing a structured organizational framework to enhance operational performance base on process mapping shown on Figure 1. Then at the end is to achieve clear role and organizational structure

show on proposed activity at Table 3 using Average linkage method shown at Figure 3, which focus on establishing clear roles and responsibilities through detailed job descriptions and organizational structure.

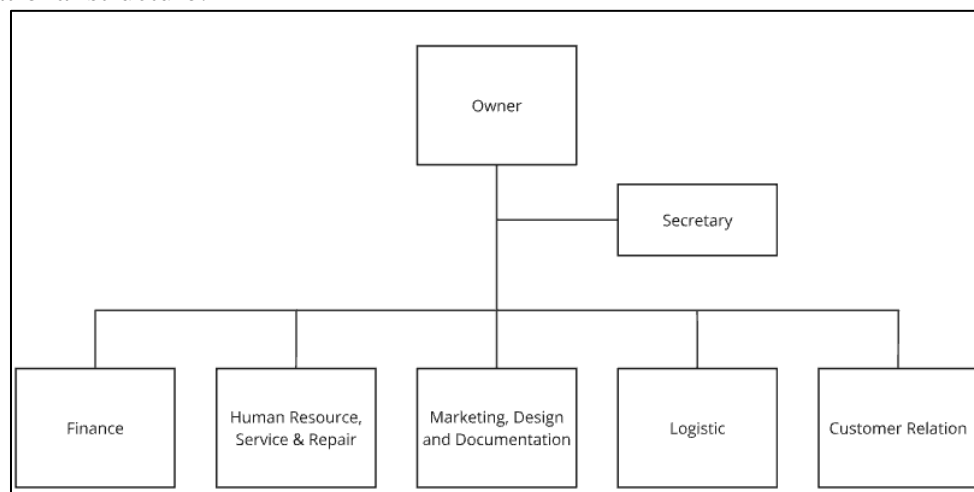


Figure 4. Proposed Prima Service Organizational Structure

The proposed organizational structure at Figure 4 was developed using hierarchical clustering with average linkage, based on dendrogram cutting points at similarity values of 34.81 and 2.22 shown at Figure 3. At the 34.81 similarity level, the grouping consolidates interdependent processes—such as human resources, service, and repair—into a single department. This alignment simplifies the flow of responsibilities and sets the stage for defining clear roles and responsibilities, fulfilling the requirements of Objective clear roles and responsibilities through detailed job description. Meanwhile, the 2.22 cut distinctly separates finance, marketing, and logistics into autonomous units, reflecting their unique operational needs and providing clarity for job descriptions in these areas.

This progression aligns with Objective to standardize work processes with comprehensive operating procedure as well. The establishment of clear departmental boundaries facilitates the creation of standardized operating procedures, ensuring consistency in processes across departments. For example, finance functions independently to handle budgeting and payroll efficiently, while human resources, combined with service and repair, manage personnel and technical operations cohesively. Marketing integrates with design and documentation to centralize promotional efforts, and logistics maintains autonomy for its specialized functions. Additionally, a customer relations department is tasked with client-facing responsibilities, ensuring that standardized service delivery processes enhance customer satisfaction.

By organizing functions systematically and addressing overlaps, the proposed structure directly supports the formulation of detailed job descriptions and process standardization. Each step in the research was designed to build towards these outcomes, ensuring that Objectives are not only met but also firmly grounded in the organizational realities of Prima Service. This approach provides a clear roadmap for implementation, enabling the company to achieve operational efficiency and sustainable growth.

5. Conclusion

In conclusion, this research presents a comprehensive approach to analysing and redesigning the organizational structure of Prima Service, an electronics repair service provider. By

employing Hierarchical Cluster Analysis with average linkage, the study identified inefficiencies in the company's current structure, such as overlapping roles and excessive workload on the owner, who also directly managed operations. The dendrogram analysis provided a clear basis for reorganizing business processes into five distinct clusters, each addressing key operational areas including finance, human resources, service and repair, marketing and documentation, logistics, and customer relations.

The proposed organizational structure not only redistributes tasks more evenly across departments but also enhances the clarity of job descriptions and reporting lines. By implementing these changes, the company is expected to reduce bottlenecks in operations, improve accountability, and delegate responsibilities more effectively, particularly in areas previously handled solely by the owner. This organizational redesign offers a practical solution to the identified operational challenges and serves as a foundation for improving Prima Service's overall efficiency and scalability in the long term.

Limitations of the Research and Suggestions for Further Research

The limitations of this research include its focus on a single company, Prima Service, which may restrict the generalizability of the findings to other organizations or industries. The use of Hierarchical Cluster Analysis with average linkage, while effective, may not fully capture the complexity of organizational dynamics, as it relies on subjective data from interviews and direct observations, introducing potential bias. Additionally, the study's qualitative approach limits its statistical robustness.

Future research could expand by including larger and more diverse samples, exploring external factors like technological advancements and market pressures, and applying alternative analytical methods for broader insights.

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