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Resources Optimization in a Facility Management

A case company in the Service Industry

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The ending feeling of studies is now finalizing, which has brought personnel to different levels of knowledge and understanding of methods for solving some problems in research methods. This is my final paperwork in this study of master's Program in Industrial Management, Vaasa University. I want to put my sincerely thank my supervisor, Professor Ville Tuomi, for his tireless guidance and the training he provided on problem solving. I would also like to thank my co-supervisor, Shahid Hafeez, for his constant support, suggestions, and reviews. Lastly, I thank my wife, Faith Ndulango, for her support and encouraging words.

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ABSTRACT:

Resource optimization in the service industry involves effectively utilizing resources to enhance productivity and meet customer satisfaction by providing high-quality services. Maximizing resource utilization benefits both the company and its customers by offering high-quality services at reasonable prices. The current thesis focuses on resource optimization in the service industry. Case Company X, a Finnish company, has operated for approximately 40 years and primarily operates in different Finnish cities, Helsinki, Turku, Tampere, Vaasa, and Lahti. The company specializes in facility management, specifically cleaning services for hotels, restaurants, nightclubs, pubs, offices, healthcare facilities, and construction sites. Thus, the thesis addresses the research question: How can resources be optimized to enhance productivity and reduce operational costs in a company? To answer the research question, semi-structured interviews were conducted with an operational manager and observations and opinions from workers at work sites in the Pirkanmaa region. The data were analyzed based on their content, which enabled the researcher to draw conclusions that reflected the interviews.

This study examines the company's operational challenges and issues and explores how it can optimize resource utilization to minimize operational costs. It provides practical guidelines for the company to mitigate its operational cost challenges. Furthermore, the results revealed that the services sector's contribution to the economy needs synchronization of technology use. This dramatically impacts service production and cost reduction in different areas to harmonize the services business's operation. In the final analysis, cost reduction in the operation department, logistics, recruitment, and employee retention is essential for successful business strategies and financial health. The studies suggested that future research is needed to identify types of cleaning, maintenance costs, and the necessary skills required in modern buildings.

KEYWORDS: Resource optimization, cost, services, operational management

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Abbreviations

RO	Resources Optimization
GDP	Growth Domestic Product
IFMA	International Facility Management Association
VRP	Vehicle Routing Problem
GVRP	Green Vehicle Routing Problem
EVs	Electric Vehicles
TST	Travel and Service Time
SERVQUAL	Service Quality

1 Introduction

1.1 Service industry

The term "services" pertains to the economic activities carried out between two parties, involving the exchange of value between the seller and buyers in the market (Wirtz & Lovelock, 2018). Consequently, services are characterized by being time-based, as the buyers of these services aim to accomplish specific objectives through their procurement. This value exchange creates expectations for the customers who invest their money, time, and effort in purchasing the services.

The prominence of service industries is on the rise worldwide and plays a significant role in the global economy. With global economic expansion, the service sector contributes to over half of the gross domestic product (GDP) growth, as depicted in the figure below, along with the distribution of employment creation between agriculture, manufacturing, and services.

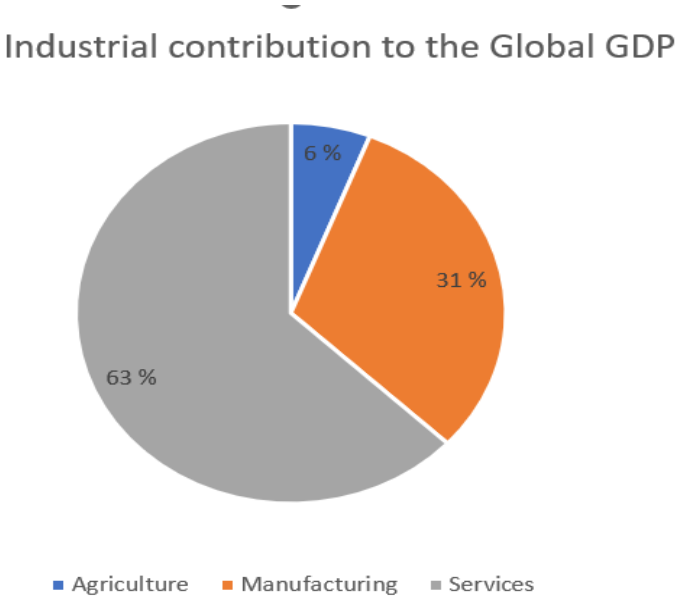

Figure 1: Essential Services Marketing (Wirtz and Lovelock, P. 7, 2018)

The service sector's rapid growth has a significant global impact, with most new job opportunities arising in this sector. Despite the misconception that service-related jobs offer low wages, in fast-growing economies, they encompass knowledge-based industries such as professional and business services, education, and healthcare (Wirtz & Lovelock, 2018). These sectors also drive other service-oriented companies.

Service providers in industries like logistics, healthcare, and facility management face various challenges related to operational expenses, covering all aspects of the value chain, including service production, logistics, and marketing (Bhiman et al., 2015). These challenges particularly impact facility management experts. These difficulties lead to increased pressure on service provision, higher service delivery costs, and added stress on providing affordable services to customers. The overarching goal is for service companies to make a fair profit while ensuring the firm's sustainability.

The service sector is Finland's leading industry, employing over a million people and driving a significant portion of Finnish exports (Palta, 2023). Over 52% of the total private sector employment in Finland is accounted for by the service sector, surpassing the combined impact of primary production, processing, and the public sector on the national economy, Finnish Commerce Federation. (2023).

To ensure the success of the service sector, it is essential to have a skilled workforce, a competitive labor market, and policies that promote export and innovation in services (Palta, 2023). In 2016, the service sector in Finland contributed over 50% to the national economy, outpacing the combined contribution of primary production, processing industries, and the public sector. Additionally, the private service industries play a crucial role in creating employment, with over half of the working hours in Finland dedicated to services. At the same time, the combined processing, production, and public sectors account for under 30%, according to the Finnish Commerce Federation. (2023).

The significance of the study is expected to be used for the company improvement process on the services delivery and continuation of quality improvement; for the student, I can synchronize the theories from school to the working environment. The student gains an in-depth concept of how a company works and operates. In contrast, the company pumping resources to offer the best results at work faces different challenges in efficient operation and cost reduction, ensuring the company's competitive advantage. Therefore, the results support the case of the company's sustainable operation and offering services at fair price charges.

1.2 Case Company

Company X, a Finnish company, was established 40 years ago and primarily operates in Helsinki, Turku, Tampere, Vaasa, and Lahti. The company specializes in facility management, specifically focusing on cleaning services for hotels, restaurants, nightclubs, pubs, offices, healthcare facilities, and construction sites. With over 1,300 employees, the company achieved a turnover of €20 million in 2020, a 33% increase from the previous year. The projected annual turnover for 2022 is Euro 30 million. The company prioritizes using environmentally friendly and biodegradable cleaning chemicals and equipment to ensure the health and safety of employees and facility users. All working equipment complies with Finnish environmental standards, which are in alignment with the safety and environmental standards of the European Union.

Transport operation costs in the Tampere district accounted for 6% of the monthly revenue in 2022. The extensive travel distances challenge service delivery within facility management, as workers commute between locations during working hours using company cars. This results in high logistics costs, and working hours are stipulated based on the service agreements at different facilities. So, concerning the subject, pose the query, "How can company X reduce the cost while maintaining or enhancing the quality of the service to a higher level?"

The figure below illustrates the company organization's flow chart and how it operates to fulfill its mission and vision and align with the strategies supporting the firm in reaching its target goal.

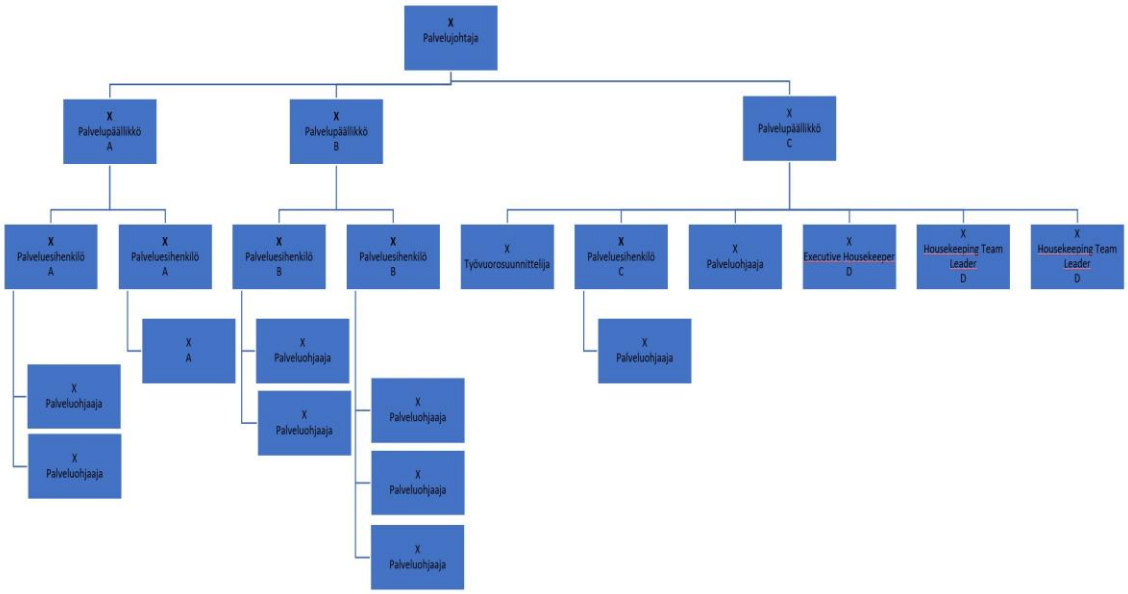

Figure 2: Organization flow chart from Company X

The distribution of the Finnish population is relatively sparse due to the settlement patterns and Finnish culture. Municipalities are mainly categorized as urban or rural, although services are uniformly provided with consistent quality standards (Publications of the Ministry of the Interior 2020). Optimization in this context entails maximizing the use of resources in production activities, particularly in the service industry. The primary objective of resource optimization is to effectively utilize resources to enhance productivity and meet customer satisfaction by providing high-quality services. Maximizing resource utilization benefits both the company and the customer by offering quality services at reasonable prices (Stone et al., 2004).

Service production involves delivering services to customers, often at locations outside the company's premises. In facility management, services are provided in various parts

of the region or district, involving multiple disciplines to ensure the delivery of quality services that meet predefined service standards. Facility management considers the built environment's functionality, comfort, safety, and efficiency, utilizing resources such as personnel, location, processes, and technology (IFMA). This encompasses various services, including cleaning, laundry, and hospitality.

Within this field, services are rendered at locations outside the company's office, with personnel allocated to different workplaces. Technology facilitates communication between on-site workers and the company office, ensuring the provision of necessary working equipment based on lead time considerations. The services supervisor at the premises must be aware of material requirements, other resources, and customer demand.

The service delivery process requires employees to travel varying distances between locations, as worksites are often dispersed within or outside the city or region. This poses a significant challenge concerning time optimization, as workers must travel using company vehicles, employee-owned cars, or public transportation to fulfill their duties. A timely delivery service is essential to align with customer requirements and the speed of services provided; thus, employees must optimize their time as they travel to the locations where services are offered. This process is costly in terms of finances and time, prompting the question of how the company can optimize resources in the service delivery process to improve service quality.

1.3 Aim and limitations of the research

The company faces challenges in resource optimization as the increased cost of operations affects its profitability. The main reason could be the inefficient use of resources to conduct daily operations and activities. Therefore, this research aims to reduce the expenses associated with the company's service delivery process. The thesis answers the

main research question: How can resources be optimized to increase productivity and lower the cost of operations in a company?

The objectives can be set as follows:

- To find ways to help the company minimize the cost of operations without compromising the service quality.
- To ascertain the efficient use of resources to maximize profit.
- To maintain high-quality service delivery while using available resources optimistically?

Regarding the limitations of the research, I am deeply passionate about this topic because it addresses sensitive issues in the service sector that employers, workers, and customers face daily with insufficient resources. The data is collected from a single company, but this is limited in understanding how other companies deal with similar resource challenges. Resources are always scarce, so there is a need for efficient resource gathering, distribution, and allocation, which raises the question of how resources can be optimized. Also, the researcher has limited access to the company's numerical data. Due to privacy, I cannot disclose the identifiers.

1.4 Basic concepts of research

Resources refer to the flow of liquid funds, materials, time, and humans, which the organization can utilize to function effectively. Each activity needs resources to accomplish the task that has been planned. Therefore, resources might include materials, energy or fuel, labor, and capital (Hansen & Owen, 2005). Resources can be over-allocated according to the demand of activity performance or under-allocated because of insufficient work (Kodukula, 2014). Resource utilization in the organization's activities must reflect the time available to perform a specific task, which results in the completion of work within a specified time to save the organization's interest and customer needs, ensuring the future organization or company needs. Therefore, when allocation continues for a certain long period, the organization's resources are wasted, as well as

overallocation. Resource leveling is required to save workload allocation and achieve optimal resource utilization (Kodukula, 2014).

Optimization refers to the action of constructing the effective utilization of resources. According to (Christensen & Klarbring, 2008) "the mathematical design optimization methods are conceptual." At this point, the model is required to determine the mechanisms of how resources can be optimized in the service industry for the best results of cost reduction. Cost reduction is an approach employed by companies to lower their expenses and boost revenues. The approaches can change based on the type of company and product they produce, either goods or services (Birman et al., 2016). There are numerous possibilities for increasing efficiency when the cost of critical activities and the factors contributing to these costs are analyzed. Management can evaluate if specific activities can be reduced or eliminated by improving processes.

Services refer to the economic activities performed between two parties, implying an exchange of value between the seller and buyers in the marketplace (Wirtz & Lovelock, 2018). Services are designed to be time-based, as service buyers aim to accomplish specific goals through the services they procure. Customers who purchase services in exchange for their money, time, and effort have certain expectations regarding the value they receive.

The theoretical component of the study encompasses vital elements that align with the study's conceptual framework. The primary objective of the study is to explore methods for optimizing resources. The research will incorporate three theories to address resource optimization: effective resource utilization, which directly influences minimizing unnecessary resource usage through proper allocation planning; cost efficiency, which impacts cost reduction; and work quality, which influences customer demand and ensures the sustainability of the service company and the business overall.

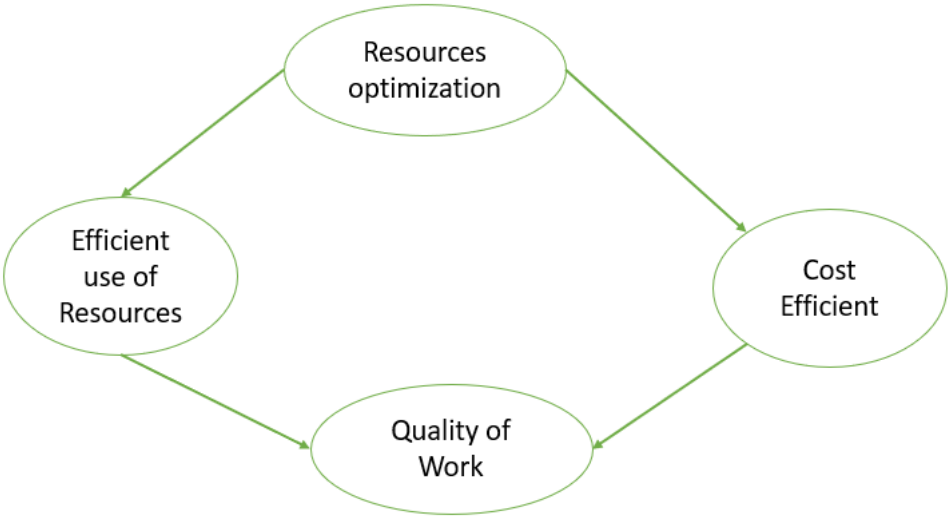

Figure 3: The study's concept is resource optimization (Josephat Ndulango, 2023).

1.5 Structure of the study

The first chapter of this thesis explains background information and outlines the research gap, problem statement, and study objective. The definition keywords used are Resources, Optimization, and the Service industry. This part of the thesis chapter elaborates on the limitations. The second chapter explains different theories concerning resource optimization, and the literature review shows the links between the topic and theories.

Chapter Three outlines the research methodology, detailing the research process, the qualitative approach employed, and the data collection and analysis procedures. The ultimate analysis aims to depict real-life business operations within the service industry accurately. Chapter four delves into the specific case industry and the operational challenges it encounters in the service business. This part explores how the company has overcome these obstacles, contributing to its continued existence. The research will contribute to cost reduction and the improvement of resource use. Chapter five will be the conclusion and discussion of the research.

2 Literature review

2.1 Resource optimization and efficient use of resources

Service companies in logistics, health care, and facility management face numerous operating costs, including costs from all areas of the value chain, such as services like logistics and marketing (Bhiman et al., 2015). Primarily, those specializing in facility management. These challenges increase the pressure on service provision, raise the cost-of-service delivery, and increase stress and tension on how the service can be reasonably priced to customers. The service company could gain a fair profit, which will ensure the firm's sustainability.

For efficient administration of the provision of goods and services in distribution channels, optimization packages based on operations research and mathematical programming methods have become increasingly popular in recent decades (Moghdani , Salimifard, Demir, & Benyettou, 2021). Various real-world examples have demonstrated that using computerized methods for distribution process planning significantly reduces worldwide transportation costs, which in most cases can be between 5% and 20%.

Resources encompass both tangible and intangible items utilized by a company in the production of goods or services. The efficient use of resources directly impacts the production process. In the service industry, high-quality service often aligns with customer expectations. Generally, operations managers are responsible for enhancing service productivity, focusing on achieving improved, faster, and more cost-effective outcomes. (Wirtz & Lovelock, 2018). Most of the time, the focus is on acting, like controlling costs at each process stage and minimizing material waste and labor.

Considering the **time** used to perform the work, the relationship between traveling time at a given time and time-of-service delivery brings a vast imbalance. The balance of travel and service time (TST) is one of the crucial elements in the service industry, such as in

the cleaning business (Shi et al., 2019). When service and operation management is required in the work plan, the consideration of the time and service delivered must be planned together to reduce the stress level for the employee and service quality assurance. The time for traveling must not be fixed as most of the time is planned in the working schedule, but when it happens, the service quality can be poor, which is risky for future business.

When the company further deals with resource optimization (RO), crucial challenges in the cleaning business arise, including properly utilizing limited resources, both labor and time. The scheduling planning process requires enough expertise and consideration of actual needs to create a good balance, reducing service production costs without causing delays and poor service quality.

The service quality would be poor and even risky for the future business when the planning ignored the uncertainty of the working and traveling schedules of the onsite workers, such as traffic jams, weather, and driving experience. Quick response from service delivery companies and failure to assess the received work orders brings challenges and stress to workers. In real business world applications, the on-site service companies for cleaning and hygienic companies (Kuo et al., 2016). The on-site service company works on service delivery, such as cleaning and logistics of equipment, such as towels and bed sheets for hotels, toilet paper, chemicals, and other kinds of stuff, to support the quality of services offered by the contracted company to deliver the services. When the order comes very often, it does not state the conditions of those hotel rooms, restaurants, and receptions, or how much time is estimated for the working schedule. The critical struggle for the companies is to have enough resources to deliver the service on time based on the request.

Machine optimization reflects the optimization of the vehicles used to facilitate work on and off different premises. These machines can be directly owned or rented by the company. **Transportation** is a considerable cost for the company to cover all areas that should

be covered with service delivery, such as hotel cleaning, warehouses, offices, and health care centers. Proper route planning could facilitate the time duration of traveling and the actual working time.

A key component of every distribution system is the routing of vehicles to service customers (Li et al.,2019). The route of vehicles for service delivery needs to be optimized in terms of traveling distance, time, and the number of customers the service technician may serve within a specified time. Furthermore, some factors regarding the vehicle route will assist with the service delivery schedule. Thus, service delivery companies must increase their focus on providing customer satisfaction and assurance in the delivery process by offering good value (Ji et al., 2017). Therefore, scheduling problems in most activities tend to cause uncertainty in real work. For example, on arrival at the work site, a technician may realize the tasks might consume more or less time than expected. In the vehicle routing problem (VRP), the service planner assumes that the time given for the service delivery to the customer sites to provide services is stochastic. The problem starts with the assumption that actual working service times and travel times are stochastic, and a time frame accompanies the start time of the working service.

The green vehicle routing problem, the reflection of GVRP, is trending to be one of the economic solutions for companies that rely on transportation to perform different tasks related to business performance to gain competitive economics and be customer oriented. Large numbers of real-world applications have widely shown that using computerized procedures for distribution process planning produces substantial savings (5% to 20%) in global transportation costs (Moghdani et al.,2021). Lowering transportation costs requires different decisions in business operations, such as moving from the conventional use of fuel vehicles to electric vehicles. There is an advantage in various aspects, with electric vehicles (EVs) producing zero CO_2 and fuel prices increasing operational costs in the service industry. Therefore, it is recommended that a brand-new electric vehicle company decide to buy or hire to reduce the service and operational costs because maintaining secondhand electric cars would cost more.

The growing interest in improving customer satisfaction has motivated researchers to conduct business studies to develop further customer-oriented models for taking time windows as an intrinsic component of workforce scheduling and vehicle routing problems (Ji et al,.2022). Therefore, activities in real business life scheduling problems become one of the subjects of uncertainty caused by other features that result from several unpredictable external events. Meeting customer desires according to the work schedule is vital for the profit and reputation of service delivery companies. Thus, companies are required to review their operational efficiency systematically. (Ji et al,.2022) Service delivery companies are mainly influenced by some of the challenges in logistics, the high degree of dynamics, and uncertainty.

A central element of each distribution technique is the routing of vehicles to save the customer's business services. Different studies have proven that applying operational and computerized techniques for designing and planning distribution networks will reduce transportation costs and assist in decision-making to achieve the desired service levels (Li, Soleimani, and Zohal, 2019). To achieve the operation techniques, it is required to apply the advanced computerized system in both ways, hardware and software, as well as information and communication technology, in the design, management, and monitoring of transportation systems through real-time data accessibility to track vehicles and desired activities. Vehicle routing problems support reducing transport costs, limited resources, and increasing customer expectations. Thus, VRP models suggest a practical solution to management and operations distribution techniques, which suggests a multi-objective optimization model for two ranking locations regarding routing problems concerning the time frame for sustainable supply chain network design.

Human resources are the company's state-of-the-art and core fundamental functional part, delivering services with economic gain. The time employees spend properly directed to the workplace results in the company's competitive advantage and increases the revenue of the contracted company, designed for service delivery.

The future of innovation operating the business unit is driven by technological, regional, economic, and social changes, sustainability, and resource restrictions (Zijm, Klumpp, Regattieri, & Heragu, 2019). This will not happen without sufficient attention from human resources in facility management. Human resources and knowledge management play a vital role in service delivery. At any workplace, when the employee utilizes the skills very efficiently, it helps to add value, and in general, the company benefits in the end. It creates additional value for the company and increases the company's revenue. To achieve this, the company must invest in the workers to achieve human resources innovation for the areas of specialization using the right technology and organization concepts. These two concepts can be achieved:

- Ongoing qualifications are needed to ensure efficient use of established workplace technology. Competitive advantages that result from specific technologies can only be exploited fully if qualification is made to measure (tools are only as good as the people who use them).
- Ongoing qualifications provide innovation potential. Only individuals and organizations appropriate the state of the art in relevant technology (Zijm, Klumpp, Regattieri, & Heragu, 2019). Keep a diary of team meetings on how the workplace can be improved. Seek the right tools to solve workplace challenges, improve working conditions, and cut down on unnecessary waste.

Travel and Service Times (TST): This is one of the crucial elements in the service industry, especially in facility management (Shi et al., 2019), as workers, in most cases, travel from one location to another, must be taken into consideration when the work is scheduled. There are some contradictions between management workers and employees working in the field. Travel and service time (TST) is considered because of uncertainty in travel and working time. During the plan, in most cases, uncertainties on the road during busy working hours are not considered; weather conditions and service delivery time are always estimated according to the agreement, but are not always the same conditions, such as in the hotel cleaning.

Service quality would be poor or risky if we neglected the uncertain TST in the planning stage (Shi et al., 2019) and focused only on cost minimization without considering other factors. The proper planning and delivery of equipment before the work timeline would impact cost minimization and reduce employee tension and stress levels during traveling time. One that can be the most effective resource optimizations is the proper utilization of limited human and equipment resources, considering time usage at each work site. For instance, the usage of the proper size of equipment, such as the size of mops, machines, and the right chemicals, would assist the workers in saving time usage at the work site, even though there might be delays during travel time; this would also have a direct impact on the company. Therefore, uncertainty may lead to infeasibility in route plans and delays in service delivery. When this happens consecutively, customer satisfaction will be reduced, thus losing the advantage in business competition. However, in these circumstances, travel service time (TST) largely depends on the actual traffic and weather conditions, which results in the challenge of predicting in advance using conventional technologies (Shi et al., 2019). To conclude, resources related to time, transportation, and human resources could be optimized properly and fairly. The delay in travel service time, which is caused by weather or actual traffic conditions, must be reported on time to provide timely information to the customer and workers to receive compensation. This action helps maintain customer relationships when they know what has happened, and increases the morale of employees.

2.2 Cost-effectiveness and process improvement

Service businesses are obliged to develop novel efficiency strategies and employ continuous improvement as a means of lowering operating expenses because of the increasing pressure on profit margins. (Kovala, Nabareseh, Stankalla, & Chromjakova, 2019). The main factor driving the implementation of continuous improvement in service firms is cost reduction. Due to the expanding importance of the services sector globally, academic and professional literature has given significant attention to the issue of service operations' efficiency.

The cost could account for a significant part of the business operation; in the services industry, costs of running the business, which is accumulated in different units of prior services delivery, would determine if the business unit is profitable or not, cost tracking would help the firm to track down the daily activities to find out which activities carry a significant part of the cost in the business operation. Cost accounting supports measuring and revealing financial and other data relating to resource acquisitions or consumption by companies (Bhimani, Horngren, Datar, & Rajan, 2015). Therefore, it includes information on managerial and financial accounting. The data will assist the firm in the identification, generation, presentation, and use of relevant data to:

- Creating strategic plans for long, medium, and short-term operations,
- Inform strategic decisions and formulate business strategies,
- Creating operational decisions,
- Control operations and ensure the efficient use of resources,
- Evaluate and present fiscal and non-financial performance to management and other stakeholders.

The service company has **different ways of lowering the operation cost of business**, while the client is finding a cheaper company, and the service provider is finding possible ways of reducing the cost of operation to maintain the profit. This contradiction caused most companies to find a model for lowering costs. This is where modern cost/ benefit ratio diagnostic comes into play, no matter how good statistical information is available; however, the complexity of the supplier-consumer/service user relationship described is not easy to fix (Gemmel, Looy, & Dierdonck, 2013).

Enterprise cost management is made through the joint implementation of several management functions, such as planning, accounting, analysis, and control of costs, which are fundamental for the health of the business firm (Pogorelov et al., 2018). The consistency of planning and cost accounting of the business firm is crucial for understanding which activities entail more cost. Also, analyzing those key activities draws the picture of the production process, where the cost needs to be reduced or increased depending on

the value of the activities in the service production process. Thus, the outcome of cost control serves as the fundamental for the coordination of the formation of the final amount and structure, the data that are crucial for making managerial decisions on the production of services and company marketing strategy to ensure sustainability in business.

Economic growth comes, in most cases, from technological and capital accumulation. The new development of goods and services brings technological change. This happens because of continuous improvement, which requires the introduction of new technology that can assist in producing better services (Parkin, 2019). Capital accumulation is the growth of capital resources, including human capital.

Cost reduction is the process of analyzing different costs at work sites depending on the activities. Managers must set cost reduction targets, which means reducing the cost per unit of the cost allocation reflected in various activity areas (Bhimani, Horngren, Datar, & Rajan, 2015). Therefore, cost analysis for the key activities (activity cost pools) is essential. Pointing out the causes of the costs incurred is known as cost drivers and allocation bases, which reveal several opportunities for improving efficiency. ABC cost analysis provides details on which activity entails huge costs in service delivery compared to others. These indicators help the company make the proper planning and improvement decisions.

There are different vital costs in service delivery within facility management:

- Labor
- Machines and working equipment.
- Transport
- Efficient usage of time in the working environment

Service companies profit when the cost-of-service production is lower than the sales. The main concern is sustainable profit, which ensures the firm's growth. When the company produces the services at lower costs and offers the services at a competitive price,

most likely, service consumers will prefer to buy the services. The cost of production is one more unit of a good or service, which is its marginal cost; therefore, marginal cost is the minimum cost of production producers incur by the price they offer to the market. Thus, the minimum cost of production with good quality at some point ensures that the service can compete with the market (Parkin, 2019). The combination of different factors involved in the production process helps the company to foresee the attributes that add to the cost of production within the production process. Process improvement in facility management is normal practice, because its role in a supply chain is to make working processes cost efficient and processes need to be managed (Myeda et.al 2023) Process improvement can be seen as a part of continuous improvement, which includes several methods, such as Lean or Lean Six Sigma. This kind of improvement is widely used in service industries (Lameijer et.al 2021).

2.3 Service Quality

Service quality refers to the user's perspective as the high standard of performance that consistently meets or exceeds customer expectations (Wirtz & Lovelock, 2018). Therefore, service quality can be difficult to manage even when failures are tangible in the working environment, which comprises machines and related things. However, improving service quality and keeping it at high standards is critical, as it is a key to customer satisfaction, repurchasing, and loyalty to a service or brand.

Service Sector companies' delivery of intangible products to the consumers/ service users, such as the cleaning and hygienic industry, the legal or audit (Bhimani et al.). These companies do not have a tangible stock of products. The quality of any service relies on service quality improvement to cut down on unnecessary waste. The outcome of continuous improvement would result in cost reduction (Kovala, Nabareseh, Stankalla, & Chromjakova, 2019). Quality is required to be maintained and improved for the reason of cost reduction on the services operation firms. The improvement of service operation required the application of the right technology and a proper method of data collection

(Belanche, Casaló, & Flavián, 2021), such as real-time data application on the services, which helps to determine what is needed in the service improvement.

Service quality management and evaluation is a very complex and problematic process. To improve the quality of services, it is crucial to understand the characteristics and features of services that customers consider most important. Companies responsible for facilities management service provision must evaluate the customers' satisfaction level with the services provided (Lepkovaa & Ūselis, 2013). In the growing service economy, quality is one of the most challenging problems when dealing with quality. Quality is one of the elements customers expect most in most service products. The service quality in facility management in Europe is governed by international standards that regulate the quality of services. For quality regulation, the following standards exist in Europe: the ISO 9000 Quality standards [27]; EN 15221-3: 2008. Facility Management — Part 3: Guidance on how to achieve/ensure quality in Facility Management.

Service reliability. Service reliability is included in dependence and performance, meaning that the firm performs the service correctly at the beginning and continues to keep its promises. Reliability includes multiple aspects that provide a usable and dependable service for the customer. Therefore, reliability focuses on the customer's experience with their services. This relies on the promises the users expect from the providers.
Reliability relates to the ability of the service provider to deliver accurate, dependable, consistent, and promised services without errors or disruptions (Parasuraman et al., 1988). Customers expect services to be consistently delivered accurately and dependably. Reliability means the service provider can be trusted to consistently fulfill promises and meet expectations. Using the aviation sector as an example, a reliable airline would ensure the flight schedules are accurate and exact. Flights depart and arrive on time, passengers' baggage is handled without damage or mishap, and flight reservations are honored.

Service reliability optimization has rarely been addressed in performance analysis for service industries. Regarding reliability, measurement techniques have been the focus of scholars in the context of service industries, and reliability optimization techniques have not received significant attention in the literature on quality engineering in service industries (Hejazi et al., 2019). Thus, the reliability of the service plays a vital role in the service industry; users of the service build trust in most cases before they choose which company they buy the services from, which can fulfill their needs. The trust came when they believed that even during an emergency, service providers would be responsive when they were in need.

Quality and reliability are interdependent because the organization cannot deal with the challenge of quality improvement to make the firm reliable without solving the challenge of quality improvement. Different methods, such as the Ishikawa method, can tackle the quality improvement challenge. This program is solving the challenge of reliability. When engineers and managers can gain much by looking at the operating system's reliability from a quality perspective, this means that if a system is unreliable, it is unpredictable. If it is unpredictable, it is not of high quality (Madu, 1999).

Responsiveness is the willingness to help the buyer and to provide prompt service. This dimension relates to the willingness and ability of service providers to assist customers promptly, address their needs and concerns, and provide timely responses to inquiries or requests (Parasuraman et al., 1991). The service provider's ability to promptly address customer needs and concerns contributed to service quality. In addition, quick responses to inquiries and efficient problem resolution are essential for high service quality. In summary, responsiveness emphasizes a sense of urgency in customer service. Adequate responsiveness and highly responsive business or organization would be a business or organization that has a customer support (contact center) team that answers and returns calls quickly, responds to emails, and addresses customer issues, complaints, or inquiries promptly.

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Assurance involves building customer trust and confidence by demonstrating service personnel's competence, courtesy, credibility, and professionalism (Parasuraman et al., 1994). When referring to assurance as a dimension and measure of service quality, the employees in the organizations are tasked with exhibiting a level of competence and professionalism in the way they carry out their duties, as well as the organization must convey the capacity to inspire in the sense of security and trustworthiness (this might be through the organizational culture, code of conduct, image/brand). A good example of assurance can be found in the healthcare industry. Assurance is perceptible when a medical practitioner communicates effectively with the patient, demonstrates a high level of expertise, and upholds a high ethical standard.

Thus, service providers who work as suppliers in the healthcare industry must ensure they will be there on time whenever customers need services. For example, they will need proper cleaning during an emergency. In a surgery room, the cleaning and hygiene company must be on time to offer the service before the surgery. This brings trust from the customer side and belief in the quality assurance from the supplier to the service users.

Empathy is one of the service quality dimensions, which involves understanding and caring about the customer's needs and circumstances. Service providers should demonstrate empathy by listening to customers, showing understanding, and customizing or modifying services wherever feasible. According to Caruana & Ewing (2010), empathy entails understanding and caring about the individual needs and concerns of customers, showing a personalized approach, and demonstrating a genuine willingness to help. This approach improves service quality and could foster customer loyalty. For example, a business such as a hotel service that offers customized service and recommendations to current/returning customers from the customer's previous preferences demonstrates empathy towards its customers.

These dimensions are often assessed using various measurement scales (such as customer feedback surveys and mystery shopping) and models, with SERVQUAL being one of the most widely used models for evaluating service quality through communication with customers and keeping them informed in a language they can understand (Wirtz & Lovelock, 2018). Service quality can be improved by customizing the service quality based on the customer's needs. Researchers and businesses use these dimensions to understand customer perceptions and expectations, identify areas for improvement, and ultimately deliver high-quality services that lead to customer satisfaction and loyalty. Continuous improvement efforts, employee training, and process optimization are essential for maintaining and enhancing service quality.

Service quality is crucial because it directly impacts customers' perceptions and aspects of a business, including customer satisfaction, loyalty, competitive advantage, and profitability. High service quality leads to high customer satisfaction. Customer satisfaction is essential to businesses because satisfied customers are most likely to recommend the service/business to others while also remaining loyal to the business. When a business consistently provides high-quality service, which leads to high customer satisfaction and promotes customer loyalty, this reduces the need for the business to constantly acquire or look for new customers, as its customer retention would be high, leading to brand

loyalty. Customers who are satisfied and loyal to a business tend to spend more over time, contributing to revenue and profitability. The quality of service can also be used to differentiate a business in its sector. Superior service quality can separate a business from its competitors, giving it an edge and making it more attractive to customers (acquiring new customers), resulting in its growing market share.

In summary, service quality is essential to any business or organization that provides services. Service quality encompasses various dimensions and directly influences customer satisfaction, loyalty, competitiveness, and success. Businesses prioritizing and consistently delivering high-quality service are better positioned for long-term growth and profitability.

Tangibles refer to the physical facilities, equipment, personnel, communication material, and visual aspects of service delivery (Wirtz & Lovelock, 2018). This means the physical appearance and facilities associated with the service (including the cleanliness of the environment), equipment used in service delivery, and the appearance of personnel (Parasuraman et al., 1985), according to (Brady & Cronin, 2001). Customer tangibles are the physical cues or evidence that customers use to assess service quality, including tangible aspects of the service environment, equipment, and communication materials. These tangibles can significantly influence customers' perceptions of service quality, an example of tangibles in the restaurant industry. Proper arrangement and good sanitation environment in the dining areas, decent and presentable work staff in uniform, and palatable and appealing food presentation all contribute to positive feedback in the restaurant industry. Also, a shopping mall with a good appearance and modern arrangement in visualization tends to attract more customers to visit that environment for different purposes, such as shopping or dining in that conducive atmosphere.

The delivery of services differs widely between the single-service provider and single-user model described in ISO 9000 standards. There are no tangible products offered in service, which means the service producer is advised to create a measurement model

that will contain the adaptive functions that would change the indicators in a constantly changing situation based on technology and material used in different premises (Lepkovaa & Ūselis, 2013). Developing feedback mechanisms helps the service provider company maintain quality standards based on the customer's requirements and work together on their difficulties. Quality indicators need minimal values, independent of the owner satisfaction level, which is necessary to ensure the stable technical condition of a building.

To sum up, in general, service quality is leading any business firm into sustainability simply because whenever we speak about service quality, the company is looking for the possibility of solving the customer’s needs and satisfaction, which is based on solving the challenges customers are facing and this can be either in terms of quality, cost, or operation of goods and services. These goods can be machines, spare parts, or services such as logistics or customer services when dealing with customers from different environments. Time optimization when the customer calls the company is crucial; no one wants to wait five minutes for the call to be received. These are some of the few things that can measure the quality of services.

3 Methodology

3.1 Research process and strategy in qualitative case study

This study is based on a qualitative research approach that involves qualitative techniques. This method includes collecting open-ended qualitative data to answer research questions (Creswell & Creswell, 2018). Qualitative methods allow researchers to conceptualize the theories and analyze the data to bring meaning to the research study. These methods often involve semi-structured interviews, observations, and focus groups. Since the study was conducted in the company, the designed questionnaires were sent to the head of the department for data that helps the case company data collection through meeting arrangements. It was essential to conduct face-to-face interviews with the head of the department to extract their perspective and general overview of the company's problem. The data was translated into figures, and a reliable translation was used to bring meaning and identify existing problems. The use of a qualitative approach supports the objective of this study, which strengthens the concept of researchers to come up with a reasonable conclusion on the research study since each research objective is categorized to use a suitable study method based on the research question design.

It is important to highlight that qualitative methods are most suitable when a study aims to understand people’s beliefs, experiences, or attitudes toward certain concepts, phenomena, and topics (Pathak et al., 2013). DeJonckheere and Vaughn (2019) have suggested that semi-structured in-depth interviews are now commonly used in qualitative research and are the most frequent data source in service industry research. This method typically consists of a dialogue between the researcher(s) and the service provider's company, which is ruled by a flexible interview procedure and supplemented by follow-up questions, probes, and comments. When it comes to the study of resource optimization, in most cases, the challenges, practical experiences, and what is involved in human experience are captured by this technique, which supports the idea of bringing a reasonable solution after conducting the interview. Semi-structured interviews are

best for this case study because they allow the interviewee to answer questions according to the questions, but can add extra information necessary for the study.

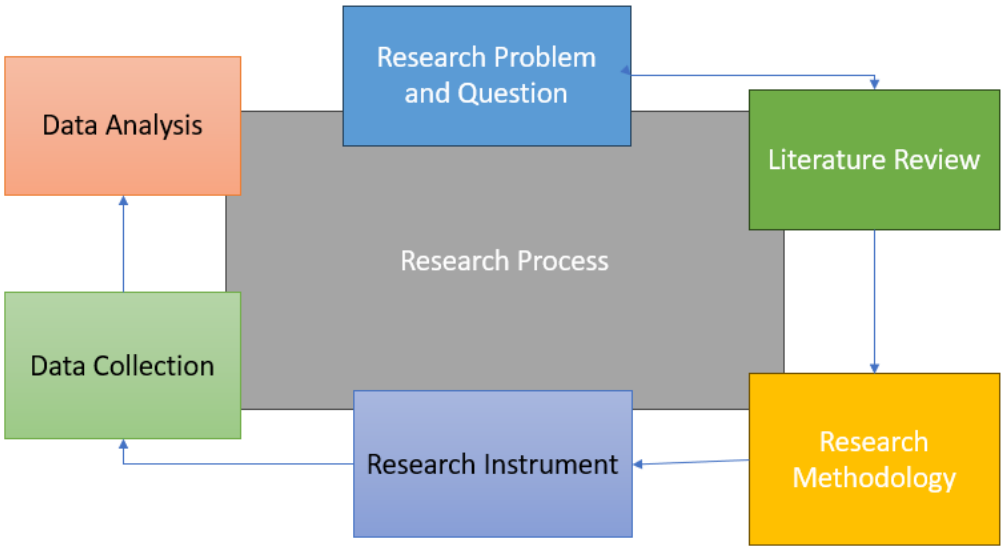

Figure 4: Research Process

Qualitative research studies fit when the objectives are to understand workers' experiences, beliefs, and attitudes toward organizations on specific matters. Qualitative research is the type of research that finds out about people's experiences (Silverman, 2021). It helped the researcher to understand what is essential for people. Therefore, qualitative studies are claimed to be concerned with subjective studies. Qualitative research complements quantitative research by comparing how social phenomena are constituted in a real-time study. This is the methodology of studies, which is guided and must be aligned with research designs, which are applied according to research questions and problems of the study. There are three main basic types of data collection methods in qualitative studies: observational studies, interview-based studies, and document or textual analysis (Gill et al., 2008; Pathak et al., 2013); one of the most valuable tools is conducting interviews with the respondent. In qualitative research, researchers posed questions to the respondent about the topic to collect subjective information related to the interviewee's beliefs and experience.

The most different feature of qualitative study is that participants are involved and feel like they are part of the study, which differs from a quantitative study (Pathak et al., 2013). Furthermore, the relationship between the researcher and participants remains very informal in qualitative studies compared to quantitative studies, which assists the researcher in digging deeper into aspects of the topic of the study, which is uncovered directly with the questionnaire.

3.2 Data collection and analysis

In designing and implementing a case study project, different basic key elements of the study design are integrated to strengthen overall study quality or trustworthiness. Researchers used this method to ensure enough detail was provided so that readers can assess the validity or credibility of the work (Baxter & Jack, 2008). The qualitative method for the company is working well because the researcher has the potential to identify the critical mechanisms of problem-solving. That means three research objectives must provide valid information based on the methodology that applies to the study objectives.

The case study research depicts clear events that happened in the company and the complex problems that exist. Company X deals with facility management, and its primary key activities are cleaning offices, restaurants, bars, hotels, healthcare centers, and shopping malls. The company is running all these activities, but the operating cost is high, which may be caused by economic fluctuations or some improper planning and coordination from the Department of Operations Management. The case of resource allocation based on need and time is one of the elements that contribute to the researcher coming up with the idea of resource optimization. Company X tried different models of optimizing resources. Some did not work correctly, such as introducing a self-driving combination floor cleaning machine. On the one hand, it solved the challenge of needing more workers, but it did not work as intended. It was even more time wasted when the machine stopped somewhere, and the workers were forced to walk all over the shopping mall to find where the machine was stuck. The machine uses a sensor and artificial

intelligence and has a safety mode. It used to stop suddenly when it sensed unsafe conditions before it crashed into other objects. Therefore, something was supposed to be done before introducing the robotic machine on the premises. That means the company could cut down on working hours, and there would be no need to walk around the mall to find out where the machine is stacked.

Company X's Department of Operations provides data through semi-structured interviews. The qualitative data was collected from key personnel in the company, including the service manager, service supervisor, and four service providers from the sites. The data was collected from the service supervisors through discussion about work, and four from the service operational team members through observation and involvement in daily work with them. The interviewees were selected from the company's team of workers. The data were collected from two respondents: the manager and the company workers. There were six interviews, and one lasted an average of 60 minutes (1 hour).

The data gathered from the operational unit of company X helped facilitate the activities and brought meaningful comparisons of operational costs across units. This data assists in comparing the time spent on driving, working schedules, fuel costs, and vehicle ownership. During the interview, the researcher asked for justification for traveling 45 minutes one way to provide a one-hour and a half (1.5-hour) service.

The unit workers and the field operation team helped to bring meaningful information. The goal is to understand if the planned activities are aligned with the workload and if the allocated time for each customer visit allows travel and work. Additionally, the researchers aim to gain insight into the challenges they face in service delivery and their daily operations.

The questions mentioned below were arranged and discussed with the company service manager. However, the interview with the service manager focused on operational procedures and resource usage, and how they can be used efficiently, which can positively

impact the company. Some of these questions are as follows: To find out how the cost of operation can be minimized without compromising the service standards and whether the use of technology is cost-effective. The researcher also discussed issues with four other company employees to gain insights. However, a question arose during the debate about how to improve the entire work plan, address the employees' challenges, and ensure customer satisfaction.

The data analysis method involves transforming interviews into data analysis to derive meaning from the research objective and align it with the research topic to address existing challenges. This approach is precious in social studies when a qualitative method is used. Planned interview questions and discussion were utilized, and the data were then written into formalized text format for analysis. The note-taking information from the interview discussion was described to bring meaning to the research. The data, such as the number of employees recruited in one year, and the cost, led the company to overuse resources. The analysis reflects the interviews and discussion.

3.3 Reliability and validity of the study

The accuracy of research depends on the reliability and validity of the study methodology, which involves proper sampling methods and the use of current data. As a result, this research uses a qualitative method, with the validity and reliability of the methodology being contingent upon the specific type of research, which may require different methods. In actual research, data, evidence, and logical considerations are fundamental in shaping knowledge, and researchers gather information in the form of completed measures (Creswell & Creswell, 2018). This indicates that the study aims to generate accurate statements describing causal relationships of interest. Therefore, maintaining a high standard of validity and reliability is crucial in research methodology (Creswell & Creswell, 2018).

The study's focus on the daily operations of a company raises essential ethical and credibility questions, especially regarding the power dynamics between the researcher and

the subjects (Karnieli-Miller et al., 2009). It also raises the issue of who controls the knowledge, and which facts are included or excluded (Grant et al., 1987). Additionally, the researcher's background, including education and social status, can significantly impact on the research process (Narayan, 1993). Therefore, ethical considerations are a top priority in this study. The researcher ensures that the participants fully understand the potential risks involved in the research and obtain their informed consent. Together, the researcher and respondents determine how the data can be stored and who can access it, and we will use fictitious names to protect the participants' anonymity and well-being (Karnieli-Miller et al., 2009).

Researchers play a vital role in research and address ethical concerns. Drawing from personal experience in the service industry, the researcher is attentive to the cultural and social contexts to ensure the well-being of the participants. As an external researcher unaffiliated with the company, the researcher is seen as impartial and unbiased by the participants, fostering an environment of trust, freedom, and confidentiality (Merriam et al., 2001; Witkin, 2014).

In addition, this study involves practicing reflexivity to address power imbalances and ensure the validity and reliability of the data (Hertz, 1997; Koch & Harrington, 1998; Maxey, 1999). Through reflexivity, the researcher is aware of stereotypes and strives to catalyze exploring issues related to resource optimization within the company (Shacklock & Smyth, 1998; May 2000). It is worth noting that while it has been suggested that most researchers hold organizational and institutional power (Henry, 2003), this is not a significant factor in this study (Grenz, 2005). The researchers anticipate encountering fluctuating power dynamics at different stages of this study. For example, during the initial phase of the study, the researcher felt powerless when recruiting participants, concerned that they might lose interest in the research process. The researcher made repeated efforts to establish rapport between the participants and myself and among the participants to cultivate a supportive and trusting relationship (Karnieli-Miller et al., 2009).

The analysis of the company's data reveals its stance on resource utilization, providing insights into optimal resource management. The qualitative technique encompasses all aspects of resource utilization within the company to enhance service delivery. It could offer insight into the future utilization of company resources.

4 Results

4.1 Minimization of operation costs without affecting service quality

The use of technology in facility management is unquestionably cost-effective, and it plays a significant role in monitoring business operations and ensuring work quality. One example of this technological application is robotic cleaning machines with artificial intelligence. The effectiveness of technology depends on the size and location of the space that needs cleaning, especially for modern or newly constructed buildings that are challenging to clean manually. For example, Company X handles two types of work sites where cleaning services are provided.

Small facilities like offices, health care facilities, and restaurants require workers with technical expertise to handle manual cleaning and maintain high hygienic standards to meet customer demands. Providing quality services in these small-scale areas is crucial for customer satisfaction and contract continuity. Still, it requires patience and adherence to rules and regulations and often consumes more time. Most personnel prefer not to rotate or work in different sites.

Large areas such as warehouses and shopping malls can benefit from machines, modern equipment, and even robots programmed to outperform human workers. This reduces the number of human resources needed and saves time. It also helps lower operational costs and maintain the same quality standards. However, applying different types of technology in more extensive facilities may impact the customer's budget. In other words, the functionality of robots in cleaning sectors is proving more cost-effective in terms of work performance and the general results.

Consideration of employees' opinions in the work plan. Work planning is sometimes considered, but not consistently, as employees' opinions may not always align with the work plan and customer needs. Employee opinions must reflect company needs and

demonstrate how they can contribute to improving service provision. Not every opinion is necessarily considered in company policy.

Considering workers' opinions contributes to their well-being and enhances their satisfaction with the company. This, in turn, positively impacts long-term motivation within the company. Retaining employees is cost-effective for the company, and those who stay contribute to delivering better services. Customers appreciate having familiar workers who understand their needs and preferences.

Activities related to the operation consume extra resources. Recruiting new employees can be a burden on the company as it consumes additional resources. However, the company must engage in this process when there is a need for new workers. Typically, the cost of recruiting one employee can amount to up to 400 €, covering various aspects such as advertising the job opening, shortlisting candidates, conducting interviews, finalizing contracts, providing training, and supplying work uniforms and safety gear.

Table 1: Illustrate the number of employees recruited in the last 12 months.

Months	Number of employees	Cost per employee €	Total €
April	10	400	4000
September	5	400	2000
Total	15	800	6000

The company retains 60% of recruited employees within one year, while 40% leave, which costs 2400€. Consequently, the company seeks to enhance worker retention and reduce recruitment costs. Implementing employee retention strategies will enable the

company to save time and financial resources, which can be allocated to other activities.

Company X previously incurred significant financial and time costs by moving mops to various addresses. To streamline operations, they centralized mop washing at the Tampere office and assigned a supervisor to distribute them as needed. While this approach initially seemed cost-effective, it ultimately proved expensive in time and money. The company bears the cost of the supervisor's distribution efforts and incurs additional fuel expenses for transporting the mops and other equipment. The company arranges two deliveries per month, with approximately 60 locations requiring monthly deliveries of mops and other daily-use items. The following guidelines provide information about the company's monthly expenses based on the table below.

Table 2: Illustrates mop delivery.

Number	Cost of Delivery in locations/month	Total cost € (12 Months)
A- 60 locations	4€/locations	(locations * cost of delivery * delivery frequency*total months in a year) (60*4*2*12) = 5760
B- One personnel	8 hours, 1hr /12.5€	One employee working hours* hourly wages* frequency of employee visits in a month* months in a year) 8*12.5*2*12 = 2400
Total cost for the year	A+B	8160

The total cost for one year of operation is € 8160 in material delivery to support the work's efficiency. This cost is only incurred in the Pirkanmaa region.

Ways can be used to reduce operation costs. Properly planning resource accumulation, allocation, and distribution is crucial for a business's profitability and sustainability. When work is allocated according to plan, even changes in the work can occur without overburdening the use of resources. Effective planning is the best way to reduce costs. Those involved in office work or business planning need to have knowledge of tools and applications that can be integrated into the work plan to avoid unnecessary additional human resources that may impact profitability.

Some activities are wasteful or unnecessary, but still consume company resources. Due to its operational model, the company must undertake the challenging task of distributing mops and other cleaning equipment. The company has valuable apps and tools to track every movement of vehicles and human resources. Failure to synchronize activities makes each task independent, burdening the firm.

High costs are incurred because working hours are paid according to agreements. Some activities that add to the additional cost need to be replanned, and decisions must be made to reduce operational costs and reallocate resources for transporting materials to other activities.

Data collected from activities that consume more resources can be used to develop and implement a plan. Data and evaluation can help the company make informed decisions about redesigning the delivery of mops and planning additional work. Investing in machinery and additional tools may help reduce unnecessary costs.

The company X may use this mechanism to minimize the **operations costs without affecting the service quality**. The study showed that delivering mops to 60 locations is unnecessary. Instead, the company only needs to establish six (6) mop washing centers, each serving 10 locations. This means the company will need to acquire new machines and set them up in 6 different sites, each serving ten (10) locations, and all six (6) centers collectively serving 60 locations. Additionally, the cleaning staff could allocate an extra 30 minutes to return the mop to the machines before starting work, and upon completion, they can retrieve the mop and hang it on the hangers.

Transporting mops to 60 locations is unnecessary, which consumes more time and resources. Finding a possible solution for installing new washing machines in 60 locations could result in more significant savings in financial and time resources, which could then be allocated to other production activities to enhance efficiency and service production. Procuring ten (10) machines would enable the company to lower costs and minimize the need for distributing and collecting dirty laundry. The purpose of procuring and installing these machines is obviously without a doubt. However, the company workers in the operations department are doing everything as usual. Table 4 below demonstrates how the machine can be installed, and the cost of traveling can be towered to fix the problem. Under normal circumstances, there is no need to transport mops as the department realizes that transporting mops consumes more financial resources to support service production.

The mindset of the service supervisors must be changed to consider cost reduction for the company's future and workers in general. This may help everyone do something small but essential for the company. When the company attains a healthy financial position, in most cases, it ensures workers receive other fringe benefits to improve employee well-being.

Table 3: Illustrate six (6) machines saved for 60 locations.

Number of Machines	Machines	Cost of machines (€)
1	1 > 10 sites = 10	450
2	1 > 10 sites = 10	450
3	1 > 10 sites = 10	450
4	1 > 10 sites = 10	450
5	1 > 10 sites = 10	450
6	1 > 10 sites = 10	450
Six (6) machines	Total Sites = 60	2700

The company plans to purchase six (6) new machines to facilitate laundry washing for 60 locations. The cost of this acquisition is estimated to be around 2700€. According to Finnish business standards, the guarantee for these machines is typically 24 months, but the motor of the laundry machines comes with a 10-year warranty. Furthermore, after 5 years, these machines can be sold as scrap for some value.

Table 5 below demonstrates how the company can save money by installing new machines weekly, monthly, and yearly. The new work model needs to be data synchronized to help the service manager make reasonable decisions that may help the company to overview the possible gap in financial utilization and why. This proper decision-making results in good planning for the future of the business firm. Planning in operation mainly needs data, which may bring positive results to the firm's operating cost of machines in each location. With the aid of the table, identify one of the key areas where the company may save funds just by implementing some of the strategic areas of machine installation per cleaning site.

Implementing some of the decisions that can support the effort of reducing the cost can minimize the **operation cost.** This will support the concept of optimizing the resources by removing some time slack and other unnecessary usage of working equipment.

Transporting mops is unnecessary for the company and more costly than setting up laundry machines at the workplace. The table below illustrates how much money and other resources can be saved when the company tries this approach.

Table 4: Operation cost of machines in each location.

Number of machines	Workers	sites	Extra Working hours	12.5€/hours
1	1	10	0.5	0.5*12.5*4
2	1	10	0.5	0.5*12.5*4
3	1	10	0.5	0.5*12.5*4
4	1	10	0.5	0.5*12.5*4
5	1	10	0.5	0.5*12.5*4
6	1	10	0.5	0.5*12.5*4
Total =6	6	60	3hrs/ week	37.5€/weeks

In the cleaning facilities, the company will allocate 1800€ to compensate six (6) workers for washing mops and maintaining cleanliness over a year, as distributing mops is included in their working hours. During the first year, the total expenditure for acquiring new equipment and hiring workers will amount to 2700€ + 1800€, totaling 4500€, whereas the cost for solely delivering mops over a year will be 5280€. That means:
1st year: 5280€ - 4500€ = 780€ is about 14,77% saving, 2nd year:5280€ - 1800€ = 3480€ is about 65,91% saving. In the first year, 5280€—4500€ = 780€ is about 14.77% savings, and in the second year, 5280€—1800€ = 3480€ is about 65,91% savings. In five years, the machines will be replaced and sold as scrap, each fetching a price of 120€, totaling 720€ for all six (6) machines. The income from selling the old machines as scrap will be returned to the company as additional income. This approach is more economically advantageous than delivering mops to each working location.

In 5 years, the machines will be replaced and sold as scrap, with each machine fetching a price of 120€, totaling 720€ for all six (6) machines. The income from selling the old

machines as scrap will be returned to the company as additional income. This approach is more economically advantageous than delivering mops to each working location.

The company could use the money from delivering mops to support other activities that help maintain an efficient and effective service production mechanism. Therefore, to sum up, this objective reflects how a company can minimize costs without compromising the quality of service. This component wants a smooth service operation while maintaining a good balance between the cost of operation and the quality of services. When the weight is balanced, the company could save financial and time resources and use them to facilitate other activities.

4.2 Assurance of efficient use of resources to maximize profit

The efficient use of resources helps the company plan for the available resources to improve the quality and business operations. This is the key point for Company X to continue its business. The company plans on the available resources and those not available for future use.

Table 5: Illustrate the resources needed for the company to deliver services.

Number	Most work requires resources to be accomplished.
1	Qualified workers
2	Chemicals and cleaning equipment
3	Cars
4	Cleaning Machines

Employees must be qualified to meet the company's standards and fulfill their contractual obligations, delivering the promised services to customers. Skilled workers should have proper training in facility management, including cleaning techniques, working in safe environments, and responsibly handling equipment and materials in the workplace.

All employees at Case Company X are responsible for using chemical and cleaning equipment according to the instructions provided in the manual. It is prohibited to use damaged equipment to ensure safety and reduce the risk of workplace accidents. The company is accountable for safeguarding customer property and ensuring the safety of its employees, while employees are responsible for reporting any work-related issues and equipment concerns.

Company-owned vehicles are to be used exclusively for work-related purposes by employees with valid driver's licenses who adhere to driving regulations. Employees must report any damage caused by themselves or third parties, while the company is responsible for fuel and vehicle maintenance to ensure fast transport for work-related needs.

Various cleaning machines are used for daily cleaning, floor maintenance, and vacuuming to simplify cleaning tasks and maintain hygiene. Users of these machines must be trained and knowledgeable in their proper handling to prevent damage or accidents that could cause harm to themselves, other personnel, service users, or property.

Cost of owning/renting some equipment needed for service delivery per month. The rental cost of a machine depends on its size; each has a different price. A small combi machine costs 100 € per month, while a big combi machine costs 400 € per month. This cost is directly related to service production every month. The good side of the rental service company is that they take care of maintenance issues when machines break. The company often does not include storage as part of the contract. When the contract is signed, they provide space to store the equipment used for daily tasks. Company X operates this facility in its office. It may function similarly to the moped, with centralized logistics managed from the company's office for delivery to the worksite. Upon receiving the logistics order, the central office staff can schedule the material delivery based on the lead time.

The cost of renting a car is about 60,000 €; only Tampere owns six (6) cars. This is the cost of renting cars used in Tampere's service production operations. The figures below show the company's pay in one year, including the cost of these vehicles' insurance and maintenance for the whole year. When the car is rented, it has two pairs of tires, winter and summer tires, and the cost of changing them is included in the vehicle.
The company possesses six (6) vehicles at Pirkamaan, each covering approximately 150 km daily. The following table displays the weekly expenditure in euros.

Table 6: Provide a visual representation of the kilometers covered each week.

Working Days	Km/Cars per day	Total Km /day	Total km* € /day	Total €/ week
Monday	150*6	900	900*0.55	495
Tuesday	150*6	900	900*0.55	495
Wednesday	150*6	900	900*0.55	495
Thursday	150*6	900	900*0.55	495
Friday	150*6	900	900*0.55	495
Total cost per week		4500	4500*0.55	2475

Consideration of other miscellaneous factors in the travel time plan. Travel timing is inconsistent, and various factors can disrupt the planned route or schedule. Delays are more common in winter than summer, but employees are compensated based on their working hours. Adjusting the work schedule to accommodate the conditions when employees are traveling is necessary. Despite this, the company compensates everyone as per the agreement.

Factors considered in route planning. Route planning involves determining the most efficient way to travel between two locations to minimize time and distance. Planning for areas along the same route can lead to cost savings. Considering time and distance, work can be completed more efficiently, resulting in financial resource savings. The company

allows employees to decide not to depend on the travel plan. The company must establish strict regulations and implement mechanisms to ensure all car users know their travel distances and costs. Implementing these mechanisms can help explore different ways to save on transportation expenses, ultimately contributing to the company's financial well-being.

Employees are compensated for their hours, including planned work and travel time. However, some areas have longer travel times than actual work hours, posing a challenge for Company X. The company is diligently seeking ways to reduce these costs.
The amount of compensation depends on the travel route and time spent traveling. This situation raises questions about why these distant work areas have not been addressed with immediate solutions.

4.3 Improve operational efficiency in the quality of services

The company quality supervisor visits the premises alone to assess the conditions and determine whether they meet the internal quality standards. They capture photos and gather information to compare with previous assessments. Once satisfied, they arrange a meeting with the customer to discuss the findings.

The case company's team and the customer inspect the premises to evaluate the physical conditions and to understand the customer's perspective on improvements. All actions align with the business contract while considering the customer's preferences. Continuous improvements are made to uphold business standards and maintain a favorable environment without misusing resources. The case company uses the Fuusor app to track and evaluate the quality of work. The app's statistical data provides feedback and trends in service quality, allowing for informed decision-making based on numerical data and mathematical tools. Client feedback is valued for identifying strengths and areas for improvement.

Discover new activities involving the job site employees who can directly communicate with the service supervisors to report on the daily workplace situation. This enables the company to receive daily updates and keep the customer informed about the ongoing activities, ensuring everything is well maintained. The cleaners carry out daily cleaning services, giving them a clear understanding of the expected standards for the workplace. Encouraging workers to collaborate in teams for various cleaning tasks promotes teamwork, enhances service delivery, and facilitates mutual learning to address workplace challenges effectively. This approach helps Company X to receive valuable feedback and make necessary improvements.

Every employee must act, as they are the driving force behind service provision. Fortunately, when employees improve service quality, it benefits company X, and customer feedback is consistently considered.

The premises' owners want to stay informed about all activities taking place on the site. They have delegated all cleaning responsibilities to company X. Consequently, the just-in-time (JIT) concept is effectively implemented to reduce inventory costs. A notable advantage of this approach is that the company seamlessly incorporates it without explicit recognition. This practice allows the company to monitor the inventory costs of various supplies such as chemicals, soap, paper bags, hand paper, rolls of towels, and leasing machines from suppliers rather than owning them. Leasing machinery is particularly crucial due to rapid technological advancements. This pertains to the terms and conditions established in the agreement between the company X and the suppliers. By paying a monthly fee, the user's company avoids incurring service costs as it covers all expenses.

Place for customer opinion. Currently, there is no standardized method for collecting feedback from customers requesting additional services. Communication typically occurs through phone calls or emails, and each customer has their preferred mode of

communication. Company X is open to any form of communication, as there is currently no established platform for engaging customers.

The company is developing a new system for the future, aiming to transition towards digitalization to save time for both the customer and the company. This will allow customers to understand the cost of additional services when ordering. For example, when requesting comprehensive maintenance cleaning, the company's application will let customers see the total cost based on time, labor, chemicals, and equipment usage.

Negotiating between suppliers and customers can be utilized for more productive activities, rather than just face-to-face meetings. Virtual meetings through applications will occur more frequently, reducing travel expenses. Additionally, negotiations often lead to quality improvement, which is essential for the sustainable growth of company X, particularly in service delivery for cleaning and related activities. When customer opinions diverge from the service agreement, company X engages in negotiations to review the agreement and find solutions to the challenges. Fulfilling service agreements and ensuring customer satisfaction are fundamental principles for the company, as they believe that customers are vital to the business and provide the means to compensate employees.

Customer feedback is carefully considered and uniquely integrated into the implementation plan. If a customer proposes something beyond the service agreement, it often leads to further negotiations, and suppliers may suggest alternative contracts. However, suppose the service can be provided within the existing framework. In that case, suppliers offer it at no additional cost to maintain a positive relationship with the customer and ensure all areas are well maintained.

The company's primary objectives are to ensure customer satisfaction, maintain a strong public image, and raise awareness about the services offered. Delivering excellent service can also attract new customers, which is the motto of Company X.

The company aims to uphold a high standard by retaining a skilled workforce to deliver excellent service. Employee retention contributes to efficient work performance and upholding high service standards. A competent workforce is the company's driving force, ensuring a steady flow of income through top-notch service delivery. This saves time and money while maintaining service quality, ultimately leading to the highest customer happiness and satisfaction.

The impact of resource allocation on service delivery. The company consumes many resources during the summer due to regular workers taking vacations. To address this, the company is hiring summer workers, both skilled and unskilled, to maintain operational efficiency and meet its goals. The company values the contribution of young and inexperienced workers for their future development and the country's overall economic growth.

The company has established different mechanisms and targets to address quality challenges during the holiday season. The company places the summer workers with those working in specific areas. Company X arranges several training sessions to reduce or remove the challenges, improve the quality of work, and address holiday-related challenges. When the concept of training the summer workers does not function, the company assigns the workers to work in teams, while each team leader guides new employees. The aim is to maintain operational standards while optimizing costs, time, machines, and human resources in alignment with the company's overall goal: to offer the best quality to the maximum. Tracking the quality and cost helps the case company to control over three consecutive years.

The use of Technology to enhance the quality-of-service delivery. The company's quality strategy is directly impacted by resource optimization as it focuses on improving quality through various operational strategies. Starting in 2023, Company X increased its emphasis on using robotic machines, allowing workers to concentrate on other tasks

requiring human attention. The 3-month trial period has demonstrated significant time savings, enabling cleaners to perform additional tasks that cannot be handled by self-driving machines (robots).

The shift towards technology adoption is primarily driven by changes in construction methods for different properties. Modern buildings are more complex to clean and maintain than traditional ones, requiring new cleaning techniques to match their structures. This necessitates using advanced cleaning technology machines and trained workers to operate them.

5 Conclusion and Discussion

5.1 Conclusion

To conclude, the study focused on the main research question: how resources can be optimized to increase productivity and lower the company's operations costs. The study's objectives answered this question and were divided into three main objectives. Each objective reflects one of the components that are intended to optimize the resources. The three objectives are stated as it read below:

- To find ways to help the company minimize the cost of operations without compromising the service quality.
- To ascertain the efficient use of resources to maximize profit.
- To maintain high-quality service delivery while using available resources optimistically?

The study offers insights into how resources can be optimized in the services industry. The answer is derived from sub-questions based on the company's needs and challenges. The company's primary challenge revolves around the logistics of delivering weekly or monthly working gear to support and maintain the quality of work. Managing costs presents a significant obstacle to resource optimization.

The company's resource optimization efforts are evident in its operational work, which aims to uphold customer satisfaction by fulfilling daily duties and maintaining quality standards per the service agreement. Despite challenges in implementation, the company prioritizes business strategy and adopts new mechanisms for process optimization, which significantly impacts business processes.

Efficient resource usage and cost-effectiveness improve operational costs, enabling the company to run efficiently while focusing on resource utilization to increase output and align with customer strategies. This approach ensures customer satisfaction and creates a friendly work environment for employees, promoting sustainability within

the business environment and benefiting stakeholders, including suppliers and customers.

The following are the research objectives, which explain each objective as a subtopic. These objectives support answering the research questions, and their findings help conclude the study topic.

Minimization the cost of operations without compromising service quality. This means that removing waste in resource usage assists the company or organization in improving its financial health. Looking ahead to how resources are used and allocated helps the company's decision-makers know which area consumes more resources unnecessarily. Based on the research, the findings identified that more time and other resources are utilized in delivering cleaning equipment such as mops, which pushed the company to assign extra workers and a car to be used for delivery.

The researcher suggested that instead of delivering the alternative to these activities, install the laundry machines within a sixty (60) cleaning center to decentralize 6 locations for mop cleaning and assign all other workers to pick up clean mops and drop the dirty mops into these six locations, near their work site. This solution helps the company to save money and time, which can be allocated to other activities that may add value in service production.

To ascertain the efficient use of resources to maximize profit. Since using light entrepreneurs, as other companies do, this model has become very functional for the service company. Working in remote areas, especially by using company resources, consumes more financial and other resources than rendering services to light entrepreneurs. In Finland, a light entrepreneur seems like a new business model, but it proves very efficient. Other companies, such as food delivery companies, use the same model. They own most apps, develop business models, and maintain customer relationships.

To emphasize the usage of private cars for work, the company compensates for traveling distances, influencing the employee to add some income and do the same work. This

reduces the cost for the company while maintaining the work performance at the same level. In one way, the company does not need extra cars for work. In this model, the employee owns his/her car, pays for his/her parking and insurance, and takes the maintenance of his/her car. The company can be in a safe mode of financial saving and other resources that are not required to be used when the work is done.

Reducing some of the workload from the office center through assigning tasks to the employees and adding additional working hours helps the employees to have additional working hours and do extra work. There is no need to do that when delivering mops using the company car. There are two possibilities to implement it in a cost-effective:

- The employee can drive and exchange the mop himself/herself from the office. However, because of the nature of the contract, the employee must drive to the main office to pick up clean mops and bring dirty laundry.
- Install a laundry machine in the work center so the employees can wash their laundry themselves, adding some minutes to the working schedule. This will improve the employees' income.

Proper planning improves the company's financial resource savings. This implies different perspectives, such as traveling to the work center, pressing supply orders, and logistics costs. The introduction of a green and sustainable supply chain assists in reducing the cost of unnecessary frequent ordering of work equipment and traveling. When there is no need to burn fuel, it is advisable to use public transport and other means of transport.

The company must shift from using ordinary fuel vehicles to hybrid or electric ones. This decision has a significant impact on the company's financial savings. Because this type of vehicle lowers the cost of running, the company will save some percentage of financial resources. Also, the company is becoming part of social and environmental responsibility.

The shift in focus and resource usage will lower operation costs and make the business very competitive against rivals. This ensures the business's sustainability and adds value to customers by helping them buy affordable services.

Maintenance of high-quality service delivery while using available resources optimistically. Employee retention has a significant impact on the company and business. Recruitment costs the company financial resources directly and indirectly because the maintenance involves extra time and other resources. Recruiting to the point where the personnel start the work requires time and financial resources. It has been proven that the company recruited about 20 personnel in one calendar year, and about 40% of them remained and continued to work. The company must establish new mechanisms to retain and continue working with them. As the company slogan says, they believe good workers, in terms of competence in skills and human behaviors, are the company's engine.

Competent employees help the company consider reducing resource usage. For instance, working in cleaning is not about pouring significant dosages of chemicals that can make the surface clean and hygienic. In most cases, the effect is the opposite. In the long term, the surface cleaned with too many chemicals becomes less clean, unattractive, and unhygienic.

Since cleaning is physical work, it is good for the company to add different packages and other incentives to motivate workers to experience the value of working with the company. For example, the company could arrange activities after work, like paying a percentage for a gym membership. Arranging some events, like the get-together part, allows employees to share discussions about work and how to improve workability or quality, and create sustainable working environments.

5.2 Discussions

The results of this thesis work suggest some **recommendations** for the case company. The company needs to adjust its operational approach to find new ways to cut costs while running daily activities smoothly. Specific aspects need to be focused on to reduce operational costs.

To start, it is recommended that freelance options be explored for carrying out tasks in remote areas. The company is currently facing substantial expenses related to travel and coordinating on-site work. Engaging freelance workers or small-scale local companies with customized agreements tailored to client needs could be advantageous. These freelancers could be on standby or have daily responsibilities to handle situations where a remote worker is unavailable. When a worker is absent, backup workers are dispatched from the main office, often requiring significant travel. Moreover, these workers are compensated for their working hours and travel time, leading to high operational costs, especially in service sectors like cleaning.

Additionally, the company should consider negotiating with employees to use their vehicles and be reimbursed for fuel expenses. This approach offers benefits as it allows employees to use their vehicles without incurring additional costs for the company. Compensation would only be provided for work-related travel distances, one-way or round-trip, in line with the company's compensation policies and regulations.

Research generalizability. Although this research is conducted on the specific case company operation in the Pirkanmaa region of Finland, the case study results can be applied to different locations of the company within Finland, for example, the Vaasa, Helsinki, and Turku regions, due to the same nature of operations. When **generalizing the results** to other companies and industries, this study has limitations and can inform some parts of the generalization. The research results can only be explained in detail for the case company because they do not provide information about other companies in Finland's operating challenges. However, they can also be used as a

guideline for other companies. Based on the study, it cannot be generalized globally because other factors need to be considered. The nature of the study and its scope are based on the Finnish environment.

The case study focuses on working and life skills in Finland. The operation of the study scenarios proved the nature of settlement and company operation in the field of facility management. The company mainly focused on cleaning services. However, the operation of work planning and distribution of work equipment might differ from that of other companies. This means each company has a different working strategy and business operation. This can identify the differences between companies, even though they operate within the same business environment.

The study's limitations to access the financial details limited its ability to identify the existing challenges based on income against expenditure, which helps to determine the company's financial health. Due to this limitation, the study observation was mostly based on research questions, not financial documentation, which could reveal the situation.

The company did not allow the researchers to interview the design team to reveal the existing conditions in the company, especially among the field work teams. This created barriers to the study, such as workers not being able to suggest the best possible ways of reducing the cost to the working environment. Regarding employee retention and other related workers and improvement affairs, employees have the best way of suggesting when they are asked what to do and how things can be improved.

This study can be considered applicable for the case company in most cases due to the nature of the study, which can also be considered partly to be used by considering the applicability to other companies and the operation environment. Considering cost in service production, it is critical for every company that wants to reduce costs in both

ways, either to improve service production or to improve the company's profitability, to ensure the sustainability of the business and other stakeholders.

Further studies are needed in a different area of facility management due to the limited number of scientific studies conducted in the field. This sector requires additional studies, such as exploring different types of deep cleaning required for various structures of modern buildings, which are more complex due to new technology in construction materials and building structures. Future research should focus on types of cleaning, maintenance costs, and the necessary skills for efficient work. These relevant skills can support companies operating in facility management by emphasizing resource usage.

Facility management is a rapidly growing sector, as evidenced by various studies. Additionally, constructing new complex and tall buildings in different parts of the world has increased the complexity of delivering cleaning services and performing other tasks. This has led to the use of new types of materials in construction, which are essential due to construction costs, building style, fashion, and customer needs. Multiple skills are necessary for efficient work performance, with a clear emphasis on adding value to the work and optimizing resource usage. The surplus resources can also be utilized in other companies or business activities, as well as in research and development, and the development of new business development strategies. Implementing this concept will add value and strengthen the facility management business.

Facility management requires modern business practices because they are essential, and a new operating model is needed to lower costs and improve management. Managing human, financial, and tangible resources is essential to facilitating the sector's ability to cope with rapid changes. Further studies in this area are required to bring knowledge to the company owners and those who run this type of business. It requires the ability to synchronize the knowledge from the machine and human resources to make it functional.

The study must clearly state and elaborate on the critical value of improving the working and living environment, and how facility management can ensure a clean and safe environment for humans and other living creatures to enjoy nature's gift. The chemical used must be friendly to nature to secure the lives of other living organisms.

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Appendices

Appendix 1. Interviews Questions

Interviews

I. To find out how the cost of operation can be minimized without compromising the service standards. (Managers)
   a. Is the use of technologies cost-effective?
   b. Are the employees' opinions considered in the work plan?
   c. Which activities related to the operation consume more resources?
   d. What ways can be used to reduce operational costs?
   e. Which activity is wasteful or unnecessary but still consumes the company's resources?
   f. What criteria/aspects/items must be considered during the work plan?

II. To ascertain the efficient use of resources to maximize profit.
   a. What type of resources are mostly needed in the company during the delivery service:
      i. _____
      ii. _____
      iii. _____
      iv. _____
   b. How much is the cost of owning/renting some of the equipment needed for service delivery, per month?
      i. Cars _____
      ii. Machines _____
      iii. Storage _____
      iv. Other facilities _____
   c. How much does fuel cost per month?
   d. How many kilometers are traveled for daily activities per person?

e. Does the traveling time plan consider other miscellaneous?
f. What is considered in route planning between one site and another?
g. Do employees receive compensation during traveling time? How much do they receive per route?

III. To establish how quality service delivery can be maintained while resources are optimized.

a. How is quality service delivery measured?

i. How can quality service delivery be maintained?

ii. Are there some platforms where customers give out their opinions?
iii. What if the customer's opinions do not align with the service agreement, how do you go about it in terms of maintaining or fulfilling service delivery?

b. How can resource allocation affect service delivery positively or negatively?
c. Do you think resource optimization can compromise the quality-of-service delivery?