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## Driving cost efficiency through operational excellence and sustainability of SMEs in Barru Regency, South Sulawesi, Indonesia

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### ABSTRACT

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This research aims to analyze the factors that influence the cost efficiency and operational excellence of SMEs in Barru Regency, South Sulawesi. This research also aims to examine the direct and indirect influence of the cost efficiency and operational excellence on increasing SME productivity. Formulate a model for cost efficiency, acceleration, and sustainability of SMEs in Barru Regency. This research uses a qualitative-quantitative concurrent triangulation approach. Data was collected through observation, in-depth interviews, surveys, and documentation involving 219 respondents, and quantitative data was analyzed using SMART PLS. The research results show that the factors that influence cost efficiency and operational excellence in SMEs are technology, quality improvement, operational resilience and continuity, and operational targets. Reviewing raw material costs and direct labor costs for SMEs can achieve cost efficiency. Cost efficiency will increase the competitive advantage of SMEs. Apart from that, there is a direct influence of 63.8% and an indirect influence of 84.8% on cost efficiency and operational excellence on the sustainability of SMEs, indirectly increasing productivity in aspects of product quality, production continuity, and operational targets will accelerate SMEs in Barru Regency. The study concluded that cost efficiency drives SMEs acceleration by fostering operational excellence, which in turn promotes SME sustainability.

**Contribution/Originality:** This paper contributes to knowledge in the field by integrating financial management, cost efficiency, operational excellence, increasing productivity, and sustainability in accelerating SMEs, while empirical research has never been conducted in the context of SMEs in Barru Regency.

## 1. INTRODUCTION

Analyze internal resources and capabilities as determining factors of competitive advantage using the Resources and Competitive Advantage framework. The Resource-Based View (RBV) approach emphasizes that an organization's internal resources that are valuable, rare, inimitable, and non-substitutable are a source of sustainable competitive advantage (Madhani, 2010; Rockwell, 2019). These resources can be physical, human, or immaterial.

Sustainable competitive advantage stems from resources that competitors rarely own, find difficult to imitate, and find difficult to imitate (Zvarimwa & Zimuto, 2022). Efficient management of business expenses, such as identifying and evaluating costs, prioritizing expenses, supplier analysis, inventory management, energy savings, automation, performance analysis, and fostering an efficient culture within the organization, can achieve competitive advantage (Farida & Setiawan, 2022; Martens, De Streel, Graef, Tombal, & Duch-Brown, 2020). Thus, implementing cost efficiency strategies and careful cost management can help achieve long-term competitive advantage for a business.

In Barru Regency, driving cost efficiency for SMEs is fundamentally necessary to propel their strategic advantage and sustainability. The persistently high production and operational costs have led to elevated product prices, undermining the competitiveness of product quality. SMEs have not yet considered cost efficiency in producing their goods or services, encompassing their expenses mainly for raw material costs, labor, machinery, equipment, and supply chain management. By seeking ways to reduce production costs, SMEs can enhance their profit margins (Sardo & Serrasqueiro, 2022; Singh, Garg, & Deshmukh, 2008).

Operational costs encompass routine expenses associated with day-to-day business operations. These contain rental or mortgage costs for business premises, utilities (electricity, water, and gas), communication expenses (telephone, internet), insurance, and administrative costs. SMEs can explore means to curtail these costs by, for example, making contract negotiations with suppliers, adopting more efficient technologies, or using cost-saving alternatives (Gunasekaran, McGaughey, Ngai, & Rai, 2009; Rizos et al., 2016; Yuyang, Wencho, & Chunxiang, 2021). SMEs can also minimize marketing costs. Promoting products or services to reach potential customers is pivotal for SMEs. Yet marketing and promotional costs can significantly burden SMEs with limited budgets. SMEs can explore more efficient marketing alternatives like digital marketing, social media, partnerships with business associates, or optimizing marketing strategies that yield better Return on Investment (ROI) (Dwivedi et al., 2021; Kumar, Bhaskaran, Mirchandani, & Shah, 2013; Nikhil, 2021). Other expenses that SMEs need to consider are financial costs, including loan interest, credit card processing fees, accounting and taxation costs, and overall financial management expenses. SMEs can seek improved financial agreements, leverage digital financial technology, or plan more efficient financial solutions (IMF, 2019). Thus, meticulously managing these various costs will aid SMEs in enhancing operational efficiency and attaining greater long-term profits.

Numerous studies have explored cost efficiency, operational excellence, and business sustainability over the years. One example is research conducted by Henriquez, Muñoz-Villamizar, and Santos (2023). They highlight small businesses' significant operational excellence compared to more advanced businesses, particularly in terms of economic performance, sustainable operational standards, environmental sustainability, and social sustainability. Further, Wojtkowiak and Cyplik (2020) reveal a strong relationship between the concepts of operational excellence and management, although a gap exists in overall continuous development. Naik et al. (2023) discover the alarmingly low success rate of sustainable operational excellence initiatives. The results of these studies emphasize the interconnectedness of cost efficiency, operational excellence, and business sustainability. All of them have a positive impact on business performance. Integrating operational excellence principles with sustainable management principles is crucial for long-term success, underscoring the need for a holistic and multidimensional approach to enhancing cost efficiency, operational excellence, and sustainability in business. Furthermore, this study primarily focuses on the necessity of combining driving cost efficiency, operational excellence, and business sustainability to achieve optimal performance. It aims to establish a strong relationship between the concept of operational excellence and sustainable management, ultimately enhancing business success through a comprehensive, multidimensional approach.

In 2022, a total of 176,637 business entities were categorized as Small and Medium Enterprises (SMEs) in Barru Regency. SMEs in the Barru Regency are predominantly concentrated in Barru Sub-district, Tanete Rilau Sub-district, and Balusu Sub-district. Some of these SMEs have been actively growing, especially in certain sectors such as (1) culinary by 43,234 units, (2) fashion by 30,149 units, (3) technology-related by 15,372 units, (4) cosmetic

by 27,698 units, (5) automotive by 25,123 units, (6) souvenir by 19,921 units, and (7) agribusinesses by 15,140 units. To achieve cost efficiency, SMEs must conduct a comprehensive cost analysis to understand their cost structure (Biadacz, 2020). For example, implementing a good inventory management system is crucial to maintaining appropriate stock levels and preventing overstocking that incurs storage costs and potential losses. Achieving cost efficiency also involves skillful negotiation with suppliers, to secure better prices, discounts, or favorable payment terms. Therefore, we advise SMEs to establish enduring partnerships with suppliers to optimize the advantages in terms of both pricing and quality. Cost efficiency can also be achieved with good quality control. It helps minimize costs related to defective goods or dissatisfied customers (Pacana & Czerwińska, 2023). By implementing effective quality control systems, SMEs can avoid additional costs arising from quality failures (Hutapea, Dewi, & Lasambouw, 2021; Zimon, 2015). In summary, this study contributes to the understanding of SMEs in Barru Regency by highlighting the importance of cost efficiency and providing practical recommendations to achieve it. This contribution supports the development of cost management theories, Resource-Based View (RBV) theories, and SMEs management. It also offers guidance to SMEs in the region on how to enhance their business performance.

Promoting cost efficiency through operational excellence and sustainability is a crucial strategy for SMEs to enhance their business performance (Henríquez-Machado, Muñoz-Villamizar, & Santos, 2021; Majid et al., 2023). Cost efficiency not only reduces costs overall but also achieves a balance between cost and quality while optimizing the utilization of available resources. Therefore, this study concentrates on answering three key research questions: (1) What factors influence the operational excellence and sustainability of SMEs in Barru Regency? (2) To what extent do inventory management, operational process efficiency, and efficient human resource utilization directly and indirectly impact the productivity enhancement and business sustainability of SMEs? (3) What is the model for driving cost efficiency and sustainability for SMEs in Barru Regency? Moreover, we have organized this study as follows: Section 2 presents a literature review related to Resource Based View (RBV) Theory, driving cost efficiency, operational profitability and SME sustainability, Section 3 describes the empirical methodology, Section 4 contains a discussion of the results, and Section 5 presents conclusions and recommendations.

## 2. LITERATURE REVIEW

### 2.1. Theory of Resource Based View (RBV)

The Resource-Based View (RBV) theory is one of the theories in the field of business strategy that concerns a company's internal resources as sustainable sources of competitive advantage. RBV theory concentrates on a company's ability to gain a competitive edge through the utilization and development of rare, valuable, difficult-to-imitate resources that competitors cannot substitute (Nayak, Bhattacharyya, & Krishnamoorthy, 2023). Resource-Based View Theory (RBV) is a concept born from the research of economists worldwide. This theory is believed to offer insights into creating a competitive advantage for a company (Madhani, 2010). The Resource-Based View Theory (RBV), pioneered by Wernerfelt (1984), considers company resources and capabilities as fundamental drivers of competitiveness and company performance (Rockwell, 2019). In RBV theory, ownership and control over strategic assets determine a company's ability to gain profits and establish a competitive advantage over similar companies (Fahy, 1996; Luo & Child, 2015). Strategies should leverage and support a company's internal strengths to attain competitive advantage. The development of RBV and related concepts forms a crucial foundation in strategic analysis, aiding managers and stakeholders in understanding critical aspects of achieving and sustaining competitive advantage in an ever-evolving business landscape.

### 2.2. Driving Cost Efficiency

Driving cost efficiency is the process or effort to reduce the operational costs of a company or organization without compromising the quality of the products or services (Farida & Setiawan, 2022; Kapetanopoulou &

Kouroutzi, 2021). Its primary objective is to enhance profitability by managing expenditures more efficiently. According to Garlatti, Fedele, Iacuzzi, and Garlatti Costa (2019), cost efficiency measures how the production process utilizes resources to generate output. Meanwhile, Olesen, Petersen, and Podinovski (2017) declare that "efficiency is the ratio of outputs to inputs or the amount of output per unit of input." Therefore, in a company, unit A is considered superior to unit B if unit A uses fewer resources than unit B to produce a product. In addition, with the same number of resources, unit A can produce more products. Eom, Yoo, and Yoo (2022) assert that efficiency measures the utilization of resource costs in the production process to produce output. Whereas Ahn, Yoo, and Cho (2023) state that efficiency is the amount of input used to achieve certain goals. The evolution of driving cost efficiency continues in tandem with technological advancements, shifts in the business environment, and the awareness of the importance of more efficient and sustainable management. However, we must balance achieving good cost efficiency with maintain product or service quality and considering the long-term impacts on employees, customers, and the environment.

### 2.3. Operational Excellence

Operational excellence is a state in which a company achieves higher efficiency and productivity in its operations compared to its competitors (Henriquez et al., 2023; Kovilage, Yapa, & Hewagamage, 2022). This advantage can arise through efficient management, the use of appropriate technology, optimized business processes, and a focus on product or service quality (Kraus et al., 2021; Oncioiu et al., 2021). Operational excellence is a formal process to enhance quality, organizational processes, pricing, customer experience, and internal workflow (Schiavone, Pietronudo, Sabetta, & Ferretti, 2023). It is a commitment to a continuous state of operation designed to maximize output with minimal input. It embodies the idea of doing more with less. Operational excellence is distinct yet akin to continuous improvement. Continuous improvement is an ongoing evaluation to enhance processes, tools, and systems. In contrast, to define operational excellence within an organization, the organization must commit to achieving a state where efficiency is ingrained (Awad, Hashem, & Naguib, 2022; Henriquez-Machado et al., 2021). Organizations must attain and sustain a normative culture. An organization must establish a normative culture that maintains its competitiveness, eliminates waste, and improves work process.

Commitment to excellence assists organizations in becoming better across the entire company (Rachman, 2022). The following are several core benefits: (1) enhanced quality, (2) cost reduction, (3) better decision-making, (4) improved employee retention and recruitment, and (5) enhanced customer relations. It also leads to better, well-designed products, which can increase customer satisfaction and longer customer lifetime revenue. Furthermore, companies capable of continuous adaptation and operational optimization will have greater opportunities to remain competitive and succeed in the market.

### 2.4. SMEs Sustainability

Sustainability in the SMEs refers to the company's ability to achieve long-term economic, social, and environmental sustainability (Martins, Branco, Melo, & Machado, 2022). In its evolution, sustainability in SMEs has become increasingly important due to the increasing awareness of the business's impact on the environment and society and the need to address social and environmental challenges. The development of sustainability in SMEs involves several aspects. The first is the environmental aspect. SMEs can adopt environmentally friendly business practices, such as using renewable energy, efficient waste management, and selecting sustainable raw materials. The second aspect pertains to the social dimension. Sustainability in SMEs encompasses socially responsible business practices, including ensuring fairness and equality in the workplace, implementing employee welfare policies, and contributing to local community development. The next is the economic aspect. Economic sustainability for SMEs includes achieving long-term profitability and operational sustainability. SMEs need to manage financial risks wisely, optimize resource utilization, and maintain competitiveness in the market. The final aspect is enhanced

transparency and sustainability reporting. Sustainability-oriented SMEs tend to be more transparent in conveying information about their environmental, social, and economic performance. Engaging in sustainability reporting can help SMEs monitor progress, communicate with stakeholders, and attract investments or customers who are concerned about sustainability. Partnerships with nonprofit organizations, governments, or larger corporations can provide access to resources, knowledge, and opportunities to help SMEs achieve sustainability goals (Ordóñez-Ponce, Clarke, & MacDonald, 2021). By incorporating sustainability principles into their activities, SMEs can elevate their competitive edge, draw the attention of customers and investors who prioritize environmental and social concerns, and play a role in advancing wider sustainable progress. The advancement of sustainability within SMEs holds significant importance in shaping a more favorable and enduring prospect for both society and the natural world.

### 3. METHODOLOGY

This research was conducted through a mixed-methods research approach (qualitative-quantitative). Mixed research methods are research methods where researchers believe both qualitative and quantitative are useful in answering questions more reliably. Qualitative research is a descriptive research type aims to uncover or interpret phenomenon through observations and interviews. It is expected to obtain supporting data from the community in the form of primary data (Ahmad & Saleh, 2019). This study observes and identifies the potential for driving cost efficiency, identifies the operational excellence of SMEs, and assesses government regulatory support in Barru Regency. It provides detailed and in-depth information about the acceleration and sustainability of SMEs in the Barru Regency area. Primary and secondary data were analyzed using qualitative techniques to systematically describe the phenomenon (Surya, Saleh, & Remmang, 2018). This research employed a non-randomized sampling technique. There were ten informants for interviews; three of them were from the SME and Cooperative Office of Barru Regency, while the other seven were SME entrepreneurs from various business sectors. This research collected data using literature review, observation, documentation, and questionnaires. First, the literature review searched for relevant theoretical references for the identified case or issue. These references included the concepts of driving cost efficiency and Resource-Based View (RBV) in building SME business strategies through internal resources as a sustainable source of competitive advantage. The second reference covered the explanation of operational excellence, the explanation of regulations in SME acceleration, and their relationship with the economic level. Next, we used the questionnaire as the primary data source in this study to gauge SMEs attitudes towards enhancing cost efficiency. The population in this study was made up of SMEs in Barru Regency. Given the diversity of SMEs, the researcher narrows the scope of the study to those engaged in culinary, fashion, agribusiness, creative product, fisheries, and event organizer businesses in Barru Regency. The results were then discussed based on the systematic discussion structure outlined in the data list. This discussion was divided into three sections: respondent data, estimation of potential driving cost efficiency based on predetermined values, and the final section consisting of SME perceptions formulated as open-ended questions. Such questions allowed the development of various strategies for driving cost efficiency, operational excellence, and sustainability for SMEs in Barru Regency.

Questionnaire data in this study was obtained through the participation of respondents directed by researchers and enumerators. Questionnaires were distributed to SMEs in Barru Regency, with the criteria used for respondent selection being: (i) SMEs operating in Barru Regency, (ii) representatives from the local government, and (iii) individuals involved in economic activities: (i) SMEs operating in Barru district, (ii) representatives of the local government, (iii) individuals involved in economic activities. The selection of enumerators in this study was based on two main considerations: (1) their ability to collect data; and (2) their understanding of the costs incurred in the SME production process. The determination of the sample in the study used the purposive sampling method, which was selected by the researcher based on certain considerations. The sample measurement technique refers to the



guidelines described by Stephen and Adruce (2018). We used the following formula to determine the number of samples:

$$n = Z^2\alpha PQ/d^2$$

The sample size (n) was determined using the formula, where  $Z\alpha$  represents the standard deviation of 1.96 with a 95% confidence level. P indicates the proportion of subjects, while Q represents 1 - P (when P = 0.5), and d is the accuracy level set at 0.15. The calculation determined that 219 respondents was the appropriate sample size.

This study uses data analysis using Smart PLS software, which is a variant-based structural equation analysis (SEM) that can simultaneously test the measurement model and the structural model. The measurement model is used for validity and reliability tests. While the structural model is used for causality testing. Structural model testing in PLS is carried out with the help of SmartPLS for Windows V.2 software. The steps taken are: 1). Designing the Structural Model (Inner Model) 2). Designing a measurement model (outer model) 3). Constructing a path diagram 4). Convert a path diagram to an equation system 5). Goodness of Fit Evaluation and 6). Hypothesis Testing.

#### 4. RESULTS AND DISCUSSION

##### 4.1. SMEs Cost Allocation and Driving Cost Efficiency Determinants

Cost allocation in industry-based SMEs in Barru Regency contributes to enhancing operational excellence and its impact on business acceleration and sustainability. Operational excellence is achieved when a company can achieve cost efficiency (Csiki, Demeter, & Losonci, 2023; Mitchell & Coles, 2003). A number of factors contributed to the development of operational excellence in relation to cost efficiency. The first was production scale; larger production at an economical scale resulted in lower unit costs. The second was the efficient optimization of manufacturing systems and supply chains, which could reduce production and product distribution costs. The next factor was good product quality and service. These can reduce costs arising from warranty claims, product returns, and customer complaints. Another factor was having an efficient inventory management system. This system helps avoid excessive costs due to overstocking or stockouts. The final factor was the optimization of labor by reducing time waste. It can help cut labor costs and enhance overall productivity. Rather, a combination of these factors can help create cost efficiency and excellence in the operations of a business entity. Figure 1 presents the trend of cost allocation based on business type.

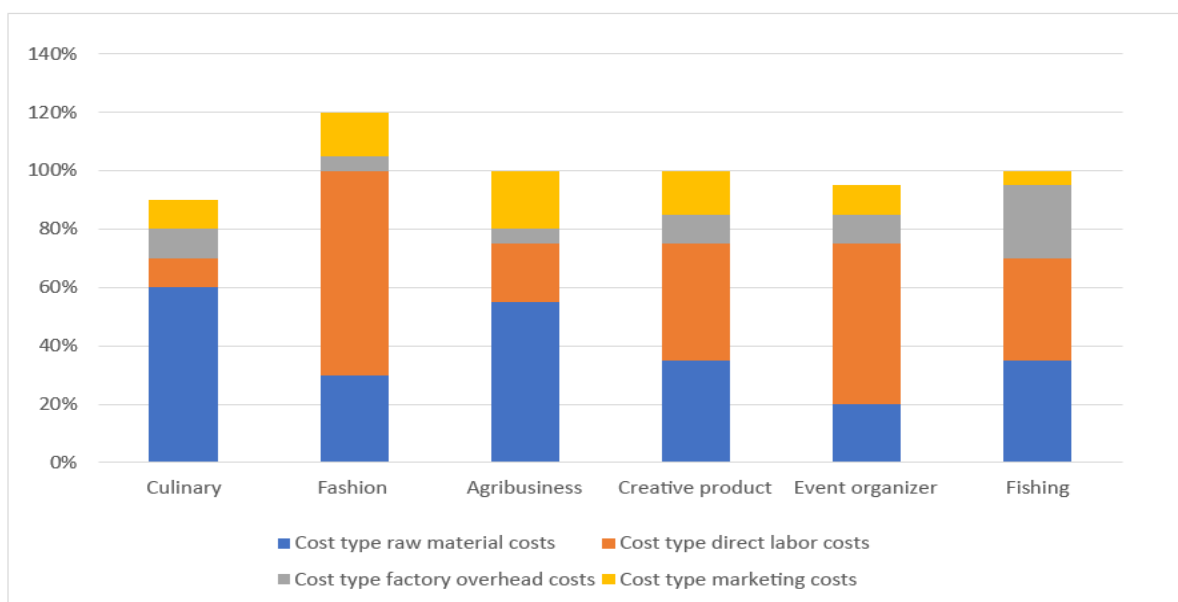


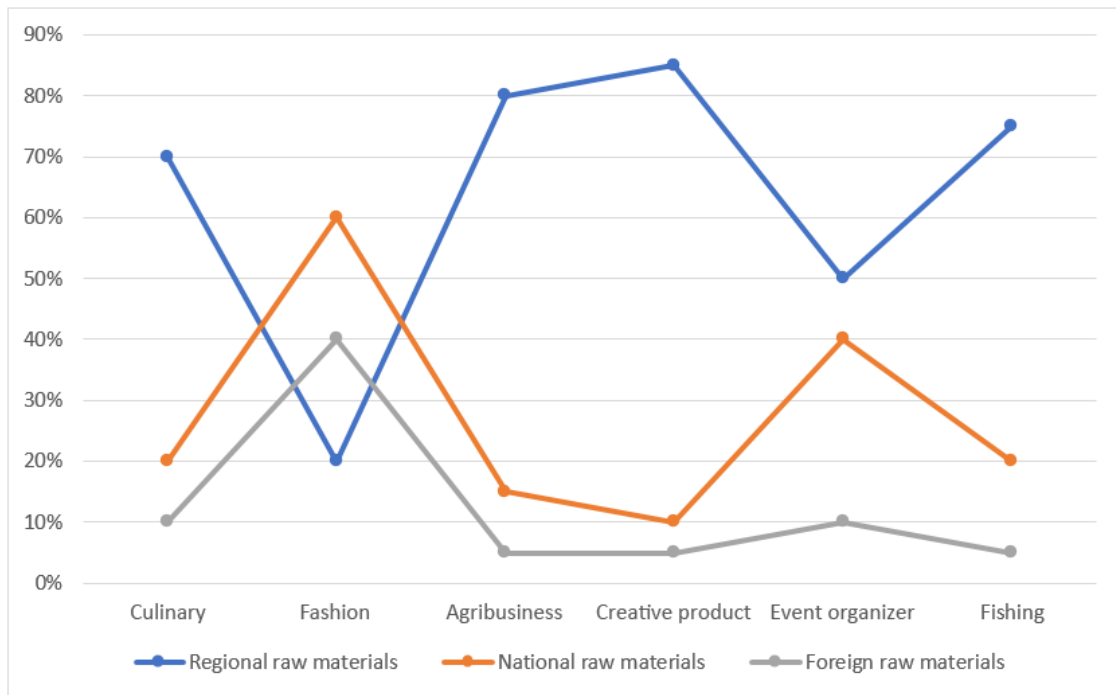
Figure 1. Allocation of costs based on the type of SMEs business Barru district.

Source: Primary data.

Figure 1 illustrates four categories of expenses utilized by various types of SMEs in Barru Regency to support their business activities. Conclusive interpretations regarding expense allocation are as follows: Predominantly, the highest expenses in Barru Regency SMEs were contributed by raw material costs at 39.17%, direct labor costs at 38.33%, overhead costs at 10.83%, and marketing expenses at 12.5%. One approach to achieving operational excellence and cost efficiency was to streamline raw material costs. Based on interview results, several measures could be taken to achieve this goal. For instance, SMEs in Barru Regency need comprehensive evaluations of raw material suppliers. Raw material costs and labor costs are quite large, so cost efficiency is needed. They should compare prices and quality from various suppliers, negotiate better prices, and seek suppliers offering substantial discounts or bulk price reductions within specified periods. In addition to that, SMEs in Barru Regency should buy raw materials in bulk to leverage wholesale pricing or supplier discounts. However, efficient inventory management systems should be carefully taken into account to avoid overstocking issues. Following that, SMEs must regularly check inventory and ensure that raw materials are not expired or damaged. SMEs should also consistently access any unnecessary production steps or process for efficiency improvements. After that, they need to consider incorporating recycled or product life cycle materials to reduce costs associated with purchasing new raw materials. It is also vital to ensure that purchased raw materials meet established quality standards. Low-quality raw materials can result in losses due to defective products or high failure rates. The seventh factor to consider is that SMEs should properly train employees in raw material management and efficient production techniques. After that, SMEs should monitor market fluctuations in raw material prices by understanding pricing trends and getting prepared by, for example, entering long-term price contracts. Finally, they should strive to enhance products and processes for greater efficiency. Hence, SMEs can enhance raw material efficiency and achieve significant cost savings. Small changes across various operational aspects can cumulatively result in substantial improvements in overall cost efficiency. This is in line with the findings of Biadacz (2020) and Eom et al. (2022).

Findings indicate that direct labor costs contribute to the second highest expenses, accounting for an average of 38.33% of the total operational expenses. Consequently, optimizing labor costs becomes a pivotal step in achieving operational efficiency for SMEs in Barru Regency. Based on interview results, several strategies can be implemented to streamline direct labor costs. One example is process optimization. SMEs need to conduct in-depth analyses of existing work processes to identify potential time and effort waste. They can enhance efficiency by reducing unnecessary steps or combining similar tasks. The second strategy is known as employee flexibility. In this strategy, SMEs need to consider employing contract or temporary labor when needed, especially for temporary, non-routine, or peak production tasks. This can help reduce fixed labor costs. Following that are incentive and compensation systems. SMEs should design appropriate incentive and compensation systems to encourage employees to work more efficiently and boost productivity. Another strategy is optimizing a multi-skilled workforce. SMEs can leverage multi-skilled employees who can perform multiple tasks simultaneously, thereby reducing the need for specialized employees for each function. In addition, they must ensure work efficiency enhancement. They should elevate work efficiency by ensuring a conducive work environment, clear task assignments, and organized workflow. The seventh strategy involves monitoring employee performance. SMEs should regularly monitor employee performance and provide constructive feedback. They need to identify areas where employees can enhance their productivity. Human resource efficiency is another essential strategy. In short, reducing direct labor costs can lead to significant overall operational cost efficiency. Figure 2 presents raw material sources based on SME business types in Barru Regency.





**Figure 2.** Source of raw materials needed based on the type of business.

Source: Primary data.

Figure 2 illustrates the sources of raw materials based on SME business types in Barru Regency. Based on the figure, the sources of the materials are predominantly from regional areas 63.33%. This is followed by the national raw material sources at 27.5% and foreign raw material sources at 12.5%. It can be implied that efficient raw material procurement can offer several benefits to SMEs (Small and Medium Enterprises). Interview results indicate that SMEs can gain several advantages from proper raw material procurement. The first example was lower unit costs. By acquiring raw materials at better prices and leveraging discounts or special offers from suppliers, SMEs can reduce production costs and enhance business profitability. The second advantage was supplying stability. Through strong collaborations with reliable suppliers, SMEs can ensure a stable and guaranteed supply of raw materials. This helps prevent production issues due to inventory shortages. In addition, this system offers consistent product quality. Procuring raw materials from reputable and high-quality suppliers assists SMEs in maintaining consistent product quality. Consistent products enhance customer trust and build a good reputation. The next advantage is production efficiency. Timely and high-quality raw materials enhance production process efficiency. This reduces waiting times and minimizes waste in the manufacturing process. After that, the SMEs must prepare for product innovation. Depending on suppliers who provide diverse and high-quality raw materials, SMEs have opportunities to develop new products or innovate existing ones. SMEs can also improve their negotiation skills. SMEs with good supplier relationships and larger purchase volumes have a stronger bargaining position in price and purchase-term negotiations. The next advantage is environmental commitment. They need to opt for suppliers concerned about environmental issues, allowing SMEs to contribute to larger social and environmental responsibilities. Risk reduction is another advantage for the SMEs. Having multiple suppliers as backup options helps reduce risk if one supplier faces production constraints or bankruptcy. SMEs can also expand their market. With efficient raw material procurement, SMEs can consider expanding their market and increasing production capacity to meet higher demand. Finally, SMEs can increase investor credibility. An efficient supply chain and secured raw material procurement can enhance business credibility for SMEs seeking funding from investors or financial institutions. In conclusion, by ensuring stable supply, consistent quality, and competitive prices of raw materials, SMEs can create operational excellence that aids them in growing and competing in the market.

4.2. Direct and Indirect Influence of Cost Efficiency and Operational Excellence on Increased Productivity and Sustainability of SMEs

This research carried out an evaluation of the structural model (inner model) to ensure the robustness and accuracy of the constructed structural model. The analysis stages in evaluating the structural model were observed through several indicators. The first indicator was the coefficient of determination ( $R^2$ ) with data processing performed using the Smart PLS 3.0 program. The obtained R square value for the variable "SME productivity" was 0.638. This acquisition explains that the percentage of SME productivity is 63.8%, which means that the variables of cost efficiency and operational excellence influence productivity by 63.8%. Unexamined variables influence the remaining 36.2%. This research also noted the R Square value for the variable "SME sustainability" at 0.848. This acquisition explains why the percentage of SME sustainability is 84.8%. This means that the variables of cost efficiency, operational excellence, and SME productivity influence SME sustainability by 84.8%, while the remaining 15.2% is affected by other unexamined variables. Second, the evaluation of the Inner Model can be observed by the value of NFI  $\geq 0.662$ , indicating a good fit. Figure 3 provides the model.

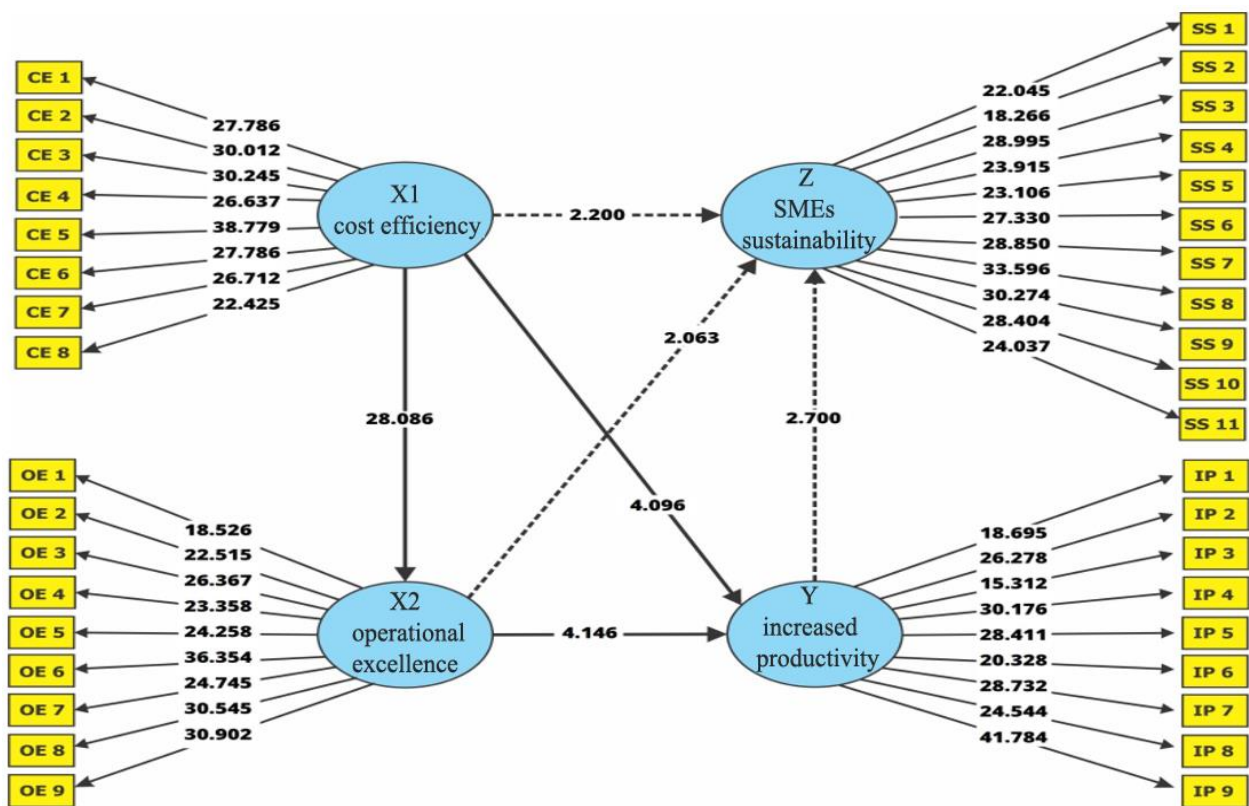


Figure 3. Evaluation of the inner model.

The results above indicate that all paths meet the significance level at a 95% confidence interval  $> (1.96)$ . This is a requirement in the evaluation with loading factors, which is conducted to assess the significance of latent constructs with their constructs.

Based on the initial model, the relationship between latent variables and others is considered valid when the value is above 1.96 with a 95% estimation parameter. In this research, assessing the goodness of fit of the proposed model in a population was done by examining the value of the relationship between one variable and another or the value of its path coefficient ( $\rho$ ). This was done by observing the magnitude of the O (original sample) value and its corresponding T-statistic value as an indication of the level of significance of the relationship between one variable and another (significance level taken at a 5% error level or above t value of 1.96).

**Table 1.** The direct influence of cost efficiency and operational excellence on increasing productivity and sustainability of SMEs.

Construct	Original sample (O)	Sample mean (M)	Standard error (STERR)	T statistic ( O/STERR )	Significance
Cost efficiency → Increased productivity	0.499	0.501	0.120	4.146	Significant and positive influence
Operational Excellence → Increased productivity	0.270	0.282	0.131	2.063	Significant and positive influence
Cost efficiency → SME sustainability	0.481	0.407	0.154	2.708	Significant and positive influence
Operational excellence → SME sustainability	0.895	0.892	0.032	28.086	Significant and positive influence
Increased productivity → SME sustainability	0.282	0.280	0.128	2.200	Significant and positive influence

Table 1 shows the results of the significant and positive direct influence of cost efficiency and operational excellence on increased productivity. The positive relationship between cost efficiency and increased productivity in SMEs in Barru Regency was underpinned by resource optimization, technological innovation, business process enhancement, and increased competitiveness. By reducing waste and effectively managing resources, SMEs can concentrate more on core activities that generate added value. This can boost productivity by optimizing the utilization of available resources. Cost efficiency prompts SMEs to seek new and improved ways to perform specific tasks. Efforts to cut costs often trigger innovation and the adoption of new technologies, which can boost overall productivity. The pursuit of cost efficiency drives SMEs to review and refine their business processes. This can lead to the discovery of new, faster, and more efficient ways of doing tasks, subsequently enhancing productivity. Cost-efficient SMEs are more likely to possess a competitive advantage since they can offer their customers competitive prices or better value. This can boost demand and increase production, contributing to enhanced productivity. Therefore, while overall cost efficiency has the potential to increase productivity, its implementation needs careful consideration and thorough planning. These results are in line with the findings of Farida and Setiawan (2022) and Hutapea et al. (2021).

This research found that operational excellence significantly impacted the increased productivity of SMEs in Barru Regency. Operational excellence refers to the ability of SMEs to carry out their operational tasks more efficiently, effectively, and innovatively compared to their competitors. It involves better resource management and operational processes. By minimizing waste, optimizing workflows, and enhancing coordination, companies can perform tasks in a more efficient manner, generating more output at lower costs. Operational excellence should involve the implementation of better systems and controls. This can help reduce error rates and defects in production or services, thereby enhancing productivity by avoiding wastage of time and resources for rectifying or fixing errors. It helps SMEs become more responsive to market changes and business environments. With operational flexibility and agility, SMEs can swiftly adapt to new demands and potentially increase productivity during periods of change. Operational excellence encourages SMEs to seek new ways of performing tasks. This can stimulate innovation and creativity in daily tasks, resulting in long-term increases in productivity because SMEs focus on improving the quality of their products or services. Higher quality can lead to greater customer satisfaction and increased customer loyalty, ultimately boosting demand and productivity. Operational excellence aids SMEs in building better relationships with suppliers, business partners, and customers. This can help companies gain better access to resources and new opportunities, positively impacting productivity. Furthermore, operational excellence is not the ultimate goal but a means to achieve better outcomes in terms of productivity,

customer satisfaction, and business sustainability. SMEs need to continuously monitor and update their operational practices to remain relevant and competitive in a constantly changing market. The results are in line with the research findings of [Biadacz \(2020\)](#) and [Henriquez et al. \(2023\)](#).

This research ([Table 1](#)) also confirmed that cost efficiency significantly influenced the sustainability of Small and Medium Enterprises (SMEs). SMEs generally have limited resources and smaller scales compared to larger corporations. Therefore, effectively managing costs becomes crucial to maintaining the continuity of SMEs' businesses. Cost efficiency assists SMEs in reducing waste and unnecessary expenditures. This can enhance profit margins and generate higher earnings from each unit of product or service. Increased profits give SMEs more resources to reinvest in the business, overcome challenges, and invest in growth. By carefully managing costs, SMEs can exercise better control over their cash flow. This helps them meet financial obligations, pay debts on time, and avoid liquidity issues that could threaten business continuity. Cost-efficient SMEs tend to have a competitive advantage in pricing. Competitive pricing can attract more customers and boost market share, ultimately aiding business growth. Effective cost management can lead to savings that can be allocated for business growth investments, such as new product development, marketing, or market expansion. This helps SMEs adapt to market changes and create new opportunities. Cost efficiency involves reducing waste and using resources more wisely. This can help SMEs become environmentally friendly and contribute to sustainable business practices, which are increasingly important in an era of heightened environmental awareness. Furthermore, in challenging economic situations, cost-efficient SMEs have an advantage in handling decreased demand or fluctuations in the economy. They have more flexibility in adjusting their operational costs without sacrificing product or service quality. Cost efficiency encourages SMEs to explore new ways of doing business. This may stimulate innovation and creativity in their operations, opening up opportunities to introduce new processes or products that enhance efficiency and productivity. By combining cost efficiency with good management, innovation, effective marketing, and a deep understanding of their market, SMEs have a greater chance of becoming more sustainable and successful in the long run. This finding is in line with the research results of [Dwivedi et al. \(2021\)](#) and [Kraus et al. \(2021\)](#).

Besides productivity, operational excellence significantly impacts the sustainability of Small and Medium Enterprises (SMEs). Operational excellence refers to efficiency and effectiveness in various aspects of business operations. It helps SMEs manage costs effectively by reducing waste, optimizing processes, and managing resources wisely. Operational excellence can help SMEs deliver high-quality products or services consistently. Good quality and high customer satisfaction contribute to customer retention, positive image, and recommendations that aid in business growth. SMEs with operational excellence are more likely to quickly adapt to changing markets, industry trends, or economic conditions. Operational excellence encourages SMEs to seek new ways of doing business. It can stimulate innovation in products, services, or processes, opening up new opportunities and aiding SMEs in development and innovation for long-term sustainability and growth. SMEs with operational excellence tend to have better control and monitoring systems. SMEs with efficient and organized operations tend to create a better work environment. This work environment helps attract, motivate, and retain quality employees. Thus, indirectly, it positively impacts productivity and operational continuity. Focusing on operational excellence also contributes to SMEs' environmental sustainability. By reducing waste, resource consumption, and environmental impact, SMEs can play a role in socially and environmentally responsible business practices. This can assist SMEs in investing in growth and other strategic initiatives. Overall, operational excellence is a crucial factor in maintaining the sustainability of SMEs. Through careful management, innovation, cost efficiency, and quality improvement, SMEs can build a strong foundation for sustainable long-term growth. These findings support the research of [Luo and Child \(2015\)](#) and [Majid et al. \(2023\)](#).

Furthermore, [Table 1](#) also shows that increasing productivity has a significant impact on the sustainability of Small and Medium Enterprises (SMEs). Increased productivity refers to the ability of SMEs to generate more output or value using the same or fewer resources. Improved productivity enables SMEs to utilize resources (such

as labor, raw materials, and capital) more efficiently. This can help reduce production costs and optimize resource utilization, resulting in higher profits and greater competitiveness. By producing more products or services at lower costs, SMEs can enhance profit margins. Greater profits give SMEs greater financial flexibility to invest, grow, and tackle business challenges. Increased productivity can help SMEs achieve larger economies of scale. The more products or services produced, the greater the potential to reduce costs per unit, which aids in enhancing efficiency and profits. Improving SMEs' productivity can increase their production capacity without significantly increasing resources or costs. This allows SMEs to respond to market demand, growth, and new opportunities. Productive SMEs tend to have a competitive edge in the market. They can offer products or services at more competitive prices or of better quality, which can attract more customers and help retain market share. By producing more products or services, SMEs can pursue market expansion opportunities or product diversification, which can increase revenue and profitability. By increasing productivity, SMEs can build a stronger foundation for long-term sustainability. These findings are in line with research by Mitchell and Coles (2003) and Naik et al. (2023).

**Table 2.** Total effect of cost efficiency, operational excellence, increased productivity, and SME sustainability.

Construct	Direct influence	Indirect influence	Total impact
Cost efficiency → Increased productivity	0.499	0	0.499
Operational excellence → Increased productivity	0.270	0.208	0.478
Cost efficiency → SME sustainability	0.418	0	0.418
Operational excellence → SME sustainability	0.895	0	0.895
Increased productivity → SME sustainability	0.479	0.446	0.925
Cost efficiency → Increased productivity	0.267	0.754	0.910

Table 2 shows that cost efficiency has a direct and indirect impact on the sustainability of SMEs, just as operational excellence has a direct and indirect impact on the sustainability of SMEs, with a total effect of 0.910. Furthermore, the mediating effect test is observed through the Variance Accounted For (VAF) value for each mediating variable. If the VAF value exceeds 80%, it indicates the role of the mediating variable as a full mediator. If the VAF value falls within the range of 20%-80%, it is categorized as a partial mediator. We conclude that there is little to no mediating effect if the VAF value is less than 20% (Baron & Kenny, 1986; Hair, Ringle, & Sarstedt, 2011; Kock, 2018).

**Table 3.** Calculation of VAF.

Construct	Mediation variables	Direct influence	Indirect influence	Total influence	VAF % (Indirect influence/Total influence)	Mediation statement
Cost efficiency → Increased productivity	Operational excellence	0.479	0.446	0.925	48%	Partial
Cost efficiency → SMEs sustainability	Productivity improvement	0.282	0.628	0.910	69%	Partial
Operational excellence → SMEs Sustainability	Productivity improvement	0.270	0.208	0.478	43%	Partial

Source: Analysis of variance data accounted for mediation (2023).

Table 3 depicts the operational excellence and productivity enhancement variables. These variables serve as supplementary mediators, signifying that both variables may explain, modify, or disrupt the relationship between cost efficiency, operational excellence, productivity enhancement, and SMEs sustainability. The concept of supplementary mediation can play a significant role. In this context, the operational excellence and productivity



enhancement variables can act as supplementary mediators in explaining the relationship between cost efficiency, productivity enhancement, and SMEs sustainability. First, the cost efficiency variable<sup>19</sup> refers to the ability of SMEs to manage and reduce operational costs. It can contribute to increased profit margins, which in turn can provide additional resources for investment and growth. Second, the operational excellence variable encompasses efficiency, quality, flexibility, and innovation in conducting business processes. A strong operational excellence can help SMEs produce products or services with lower costs and higher quality. Hence, it increases productivity. After that, the productivity enhancement variable<sup>15</sup> refers to the ability of SMEs to produce more output using the same or fewer resources. Productivity enhancement can improve efficiency, competitiveness, and business growth. The final variable is SME sustainability, which involves business's ability to endure and thrive in the long term. This encompasses various factors, including financial stability, revenue growth, operational flexibility, and a positive impact on the environment and society.<sup>24</sup> These results are in line with the findings of Olesen et al. (2017) and Nikhil (2021).

In supplementary mediation, operational excellence and productivity enhancement act as mediators that help explain how cost efficiency contributes to SMEs sustainability. This process of mediation can be explained as follows: First, cost efficiency (variable X) directly influences operational excellence (Mediator 1, Variable M). Second, operational excellence (Mediator 1) also affects productivity enhancement (Mediator 2, Variable M). After that, productivity enhancement (Mediator 2), in turn, influences the sustainability of SMEs (Variable Y). In this context, operational excellence and productivity enhancement serve as mediators that help explain how cost efficiency contributes to SMEs sustainability. This mediation process can help elucidate the underlying mechanisms and relationships among these variables in great detail.

## 5. CONCLUSION

Proper cost allocation among SMEs in Barru Regency contributes positively to increased operational excellence. Several factors play an important role in achieving operational excellence through cost efficiency. To achieve the goal of cost efficiency and operational excellence, SMEs in Barru Regency need to conduct a thorough evaluation of raw material suppliers, take advantage of wholesale prices or discounts with bulk purchases, maintain raw material quality, optimize production techniques, consider the use of recycled raw materials, train employees well, monitor changes in raw material prices in the market, consider the use of technology, and strive to improve overall products and processes. Thus, small changes in various aspects of operations can have a big impact on overall cost efficiency in an effort to achieve operational excellence.

Optimization of labor costs is a key step to achieving operational efficiency in these SMEs. The ways to achieve direct labor cost-efficiency include work process optimization, employee flexibility, incentive and compensation system design, outsourcing considerations, use of multi-functional workforce, work efficiency improvement, employee performance monitoring, and human resource efficiency.

The positive relationship between cost efficiency and productivity improvement among industrial SMEs in Barru Regency is based on several factors. First, resource optimization, which refers to using resources more effectively and reducing waste, helps SMEs increase productivity. Second, technological innovation enables the use of new or improved technologies in business processes, which contributes to increased productivity. Third, business process improvements help SMEs find new, faster, and more efficient ways to do work, which in turn increases productivity. Fourth, improved competitiveness helps SMEs attract more customers and increase production, which results in increased productivity.

Operational excellence has a significant impact on increasing the productivity of SMEs in Barru Regency.<sup>6</sup> Operational excellence involves efficiency and effectiveness in running various aspects of business operations. By minimizing waste, optimizing processes, and managing resources wisely, SMEs can increase productivity by producing more output at a lower cost.



SMEs that implement cost efficiency and enhance operational excellence ensure their sustainability through increased productivity. The combination of cost efficiency, enhanced operational excellence, and increased productivity can form a robust strategy to ensure the sustainability of SMEs. Effectively managing costs is the initial step toward SMEs sustainability. Business development, innovation, and other operational enhancements can benefit from these costs savings. Better processes, efficient resource usage, and effective management can help SMEs generate more output at lower costs. This can contribute to increased revenue and profitability. By combining cost efficiency, operational excellence, and increased productivity, SMEs have a greater opportunity to invest their resources in new product development, market expansion, or business diversification. SMEs can readily adapt to market changes, navigate economic challenges, and respond to emerging opportunities. Prioritizing costs and operational efficiency also contributes to environmental sustainability. By reducing resource waste and environmental impact, SMEs can play a role in socially and environmentally responsible business practices. With a balanced and well-planned approach, the combination of cost efficiency, enhanced operational excellence, and increased productivity can help maintain and enhance the long-term sustainability of SMEs.

This study has several limitations, including: 1). Data Limitations: Data collection for this study was challenging due to limited access to relevant and detailed information about SMEs in Barru Regency. 2). Methodology: The research faced limitations in terms of the methodology used, especially in covering the entire complexity of sustainable grassroots economic development. It was very difficult to incorporate all aspects of this topic into the research methodology. 3). Generalization of Results: As this study focused on SMEs in Barru Regency, South Sulawesi Province, the results may not be fully generalizable to other countries or different economic contexts. The unique economic, social, and political conditions in a region may affect the results of the study. 4). Research Timeframe: The research was conducted over a period of time, and the economic and financial conditions of SMEs may fluctuate over time. Therefore, the research results only reflect the situation at the time of the research and may not necessarily cover long-term dynamics. 5). External Factors: External factors, such as changes in government policies or fluctuations in the global economy, also affect the economic growth and financial management of SMEs. Limitations in controlling these factors may affect the results of the study.

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**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

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