

Dynamic Balanced Scorecard Performance Analysis of Medical Device Distributor During the Covid-19 Pandemic Crisis

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Abstract

The industrial situation has been faced with new challenges to be able to get out of a challenging situation to continue to serve customers by maintaining good performance during years of Covid-19 pandemic, even though this is a challenge to be able to learn to anticipate similar events in the future which will come. Objective achievement to analyze indicators performance of the technical division of the medical equipment distributor during the pandemic as an object to be able to find out what performance has decreased and needs to be improved to anticipate crisis conditions such as pandemic crisis conditions as happened before. This study concludes that the analysis that occurred due to the decrease in order completion targets during 2021 performance indicator that was fixed at the root of the problem made positive implications for other indicators, with a 99% increase in spare parts availability, 86% parts responsiveness, and 81% troubleshooting time, and 77% order completion time. The industrial implication of this research is that the conceptual method with a dynamic balanced scorecard strategy map can be well applied to anticipate a decline in performance in times of crisis.

Keywords

BSC, DBSC, FMEA, 5W1H, RCA

1. Introduction

Lean approaches provide a more reliable, higher-quality product and reduce lead time and cost. Lean medical device distribution would employ root cause analysis to eliminate mistake causes instead of adding inspection stations. Customer satisfaction, fast delivery, and reducing delays are crucial given COVID-19's growing medical product needs (Trubetskaya et al., 2022). Framework for buyer selection in the unique circumstance presented by the COVID-19 pandemic, during which the demand for goods and services associated to healthcare has significantly grown. (Mushtaq et al., 2021). There is a possibility that the regulatory framework for the medicinal product COVID-19 has been broken by the current outbreak. The COVID-19 outbreak pushed the issue to the forefront for high-income nations together with small as well as intermediate countries (Badnjević et al., 2020). Workers in the field of aerospace engineering consider that the average data at the first build, which measures workload, is of a medium nature. In general, respondents find that the pressures of their jobs are bothersome (Widodo et al., 2021). To reduce exposure among healthcare and non-healthcare employees, the present COVID-19 pandemic has adapted speed to the adoption of system intelligence and process improvement in healthcare (Gerke et al., 2020). Virtually everyone who does any kind of job from home is required to make use of digital improvement of technology. Due to the COVID-19 crisis, it is feasible to assert that company operations and business models have experienced some type of digital improvement and speed of transformation (Stalmachova et al., 2022). Professionals' ability to maintain a healthy work-life balance is the key to greater productivity; yet this balance was severely disrupted during the COVID-19 pandemic lockdown owing to rapid unanticipated shifts (Pai et al., 2021). In early 2020, COVID-19 surfaced in Indonesia, prompting the government to proclaim a state of emergency. To combat COVID-19, it is necessary to acquire medical equipment via an emergency supply chain (Putra, 2021). Existing frameworks concentrate mostly on effort reduction, but other areas, such as consumer health and disease control, may also be enhanced during Covid-19 outbreak (Garzotto et al., 2021). Risk identification is performed utilizing analytic instruments Using diagram analysis and scatter plot, the degree of significance of a crucial risk is determined, such that two high risks, namely the usage of Covid-19 and also

the eminent domain procedure, need closer attention (Ariyanti et al., 2021). There were a variety of factors that contributed to the inability to meet performance objectives, including human factors, in specific lesson, and method variables, which including entered by the user frameworks, spare parts regulate and stock control, price convenience, center customer support, pull facilities, payment processing frameworks, guarantee techniques, and a service activity tracking (Aljabar & Hasibuan, 2021). The quality of the manufactured goods is given undivided attention; however, less work is put in to developing the organizational performance, which is what drives the total quality of the manufactured goods (Widjajanto & Rimawan, 2021). Businesses have been analyzing and bettering their productivity with the use of the Balanced Scorecard (BSC) for the last 30 years. To the best of the application of the technique, no previous systematic study has employed a scientific framework that is both comprehensive and stringent to assess the impact of BSC implementation in health care facilities (Amer et al., 2022). There is prior evidence to suggest that the balanced scorecard (BSC) may help manufacturing small and medium-sized firms achieve long-term sustainability (Reynolds et al., 2019). BSC implementation within the context of the healthcare organization or industry, which serves as the channel via which obstacles and facilitators for the BSC within the healthcare sector are introduced (Li et al., 2021). Businesses have been analyzing and bettering their productivity with the use of the Balanced Scorecard (BSC) for the last 30 years. Towards the best of the application of the technique, no controlled studies investigation has used a scientific framework that is both comprehensive and stringent to assess the impact of BSC implementation in health care facilities (Teichgräber et al., 2021). Result of research a key direction management support that was produced by incorporating the Balanced Scorecard. This tool is intended to aid businesses in planning, analyzing, and monitoring project performance in a manner that is aligned with their vision and strategy (Huynh et al., 2021). The Balanced Scorecard (BSC) assessment can detect linkages between various parts of the company's operations as well as the interactions that take place amongst them (Stancu et al., 2018). The theoretical model proposed in this research provides the framework of a DBSC with in procedure distribution network and thus should be used as a basis for developing an actual DBSC design (Anjomshoae et al., 2017).

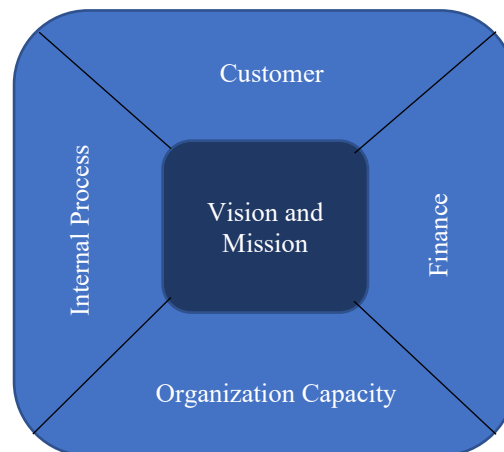


Figure 1 Balance Scorecard Framework

If a company's executives evaluate and modify its strategic, they employ internal business facts in addition to fresh data again from outside context and competitive ecosystem, which is a major invention derived from the notion of integrated strategy making and operational management systems. The emphasis and objectives of the management in this situation, such as creating a strategic framework, coherence, and job performance, are all included into the BSC understanding the interactions as following in Figure 1.

1.1 Objectives

This study aims to analyze what performance indicators are the company's need to improve as an impact during Covid-19 pandemic crisis.

2. Methods

This research intends to examine the performance of a medical device distribution company's engineering division during the Covid-19 pandemic, when it was challenged to respond to pandemic circumstances and continue to give

the best performance. The issues encountered, such as societal constraints, logistical difficulties, and other hurdles, will be thoroughly examined. The evaluation of the performance of this organization's technical division continues by looking for improvement gaps so that the company may develop its operational effectiveness that can compete worldwide based on the Balanced Scorecard reference that multinational firms have used, as well as the usage of FMEA to boost efficiency. This improvement is possible since the company uses FMEA. The study may be shown to have progressed through the following phases in Figure 2.

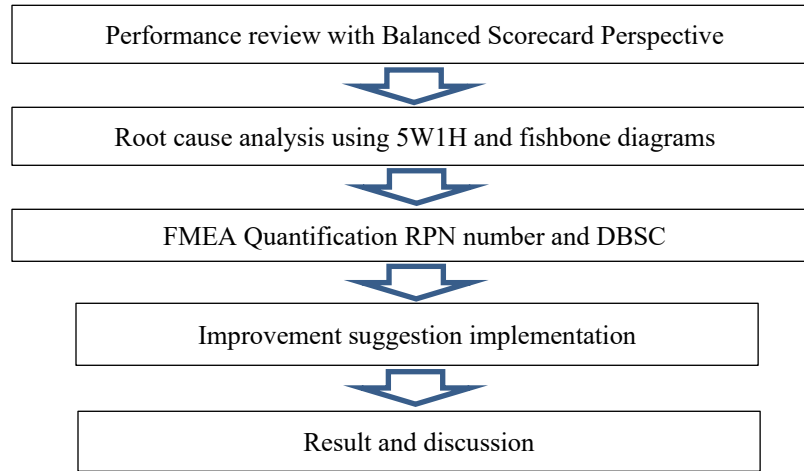


Figure 2. Research Framework

3. Analysis and Result

Cascading vision to a strategy map will result a complete framework of balanced scorecard method that we can see at Figure 3, a very good way to see the goals of an organization become more structured and easier to understand for all components of the process of achieving goals.

Vision	Creative and innovative medical and hospital equipment distributor as well as professional strategic partner		
Mission	Provide high quality products with the best skills and support to customers		
Strategy Priority	Creative and Innovative	Product Reputation	Best Services
Strategy Target	Become a strategic and professional partner for manufacturers and customers	Provide high quality and competitive products	Reliable service supported by quality human resources
	Objective Strategy	Performance Indicators	Target
Finance	Revenue	Revenue 2021 (K7) Budgeting 2021 (K8)	5 million Maximum 45%
Customer	Customer Satisfaction	Parts delivery (K5) Troubleshooting time (K6)	20 days 25 days
Internal Process	Stock Management Order Control	Parts availability (K3) Order completion (K4)	15 days 30 days
Organization Capacity	Knowledges Skills	Product knowledge (K1) Technical skill (K2)	70% 70%
Integrity	Teamwork	Solution	Innovation

Figure 3. Strategy Map

3.1. Balanced Scorecard Previous Performance

Using the Dynamic Balanced Scorecard (DBSC) technique, this research attempts to identify and evaluate the reasons of work completion times for orders received by the engineering division. This chapter contains the major findings, which are answers to the formulation of the problem, links to previous research, implications, and limitations of the study. The data is processed by internal resource persons, who are expected to be able to see the conditions from a broader and more detailed perspective because they work within the company.

The balanced scorecard, which serves as the primary variable reference in this research, has four major variables, including organizational capacity, which is essentially a fundamental process that serves as the primary basis for carrying out organizational tasks. in the sector to the requirements of clients with high expectations, particularly in the realm of health, which in this instance is largely hospitals. (Table 1)

The following variable is an internal process that describes an increase in supporting daily activities that focus on the dimensions of stock management and order control improvement, with indicators of spare parts availability and order completion time, followed by the customer variable and its dimension, namely increasing customer satisfaction with time indicators. send replacement parts and troubleshooting time, and the final one is the financial variable with dimensions of growing engineering division revenue from spare part sales and dimensions of decreasing operational expenses with work indicators being sales objectives for 2021 and budget for 2021.

Table 1. Balanced Scorecard Result 2021

No.	Perspective	Dimension	Indicator	Unit	Dec-21	Target	Gap	Result
1	Organization capacity	Knowledge and skill	Product knowledge	Percent	75%	70%	5%	Exceed
			Technical skill	Percent	70%	70%	0%	Achieve
2	Internal process	Inventory management	Parts availability	Day	32	15	-113%	Not achieved
		Order management	Order completion	day	46	30	-53%	Not achieved
3	Customer	Customer satisfaction	Sparepart delivery	Day	39	20	-95%	Not achieved
			Troubleshooting time	Day	42	25	-68%	Not achieved
4	Finance	Sales service	Sales target 2021	Billion IDR	5.8	5	16%	Exceed
		Operational cost	Budget 2021	Percent	32%	Max 45%	28%	Exceed

3.2. Root Cause Analysis 5WH

Four of the eight performance indicators of the technical division have not met their targets, whereas the other two have achieved their targets well beyond the specified targets. The two indicators that exceed these targets are financial variables with dimensions of increasing income with sales target indicators with a value of 16 percent, and dimensions of reducing operational costs with the annual budget as an indicator. further improvements, a Root Cause Diagram (RCA) analysis was performed using a Focus Group Discussion (FGD) with a technical team that carried out all the procedures discussed before, the results of which revealed four indications that required remedial action. Table 2 shows the findings of the FGD talks, with the table indicating the precise reasons or difficulties of not meeting the objectives on the four indicators whose results were previously reviewed, the evaluation refers to the findings of the FGD and continues into a 5WH analysis as well as a Fishbone diagram. The performance is then developed into possible failures in the performance process of the engineering division of the company that is the object of research, which is then re-evaluated to determine the cause of the division's deteriorating performance. technique, the overall main reference represents the Balanced Scorecard variable with the core performance experiencing a decline, then

every detail of the performance is calculated using severity, occurrence, and detection assessments with the final result being the risk priority number (RPN) value, from RPN conclusion in Table 2, technique, the overall main reference represents the Balanced Scorecard variable with the core performance experiencing a decline, then every detail of the performance is calculated using severity, occurrence, and detection assessments with the final result.

Table 2. 5W1H Result

No	Description	What	Why	Where	When	Who	How
1	Stock availability	Autoclave does not have enough replacement parts available.	It is necessary to ensure that customer orders can be processed immediately without waiting for new stock.	Spare parts operations	Every week and at the conclusion of each month, stock adequacy measurements must be evaluated.	Technical administration and sales service evaluate the sufficiency of the quantity of spare parts.	The measure of spare parts stock sufficiency is determined by averaging sales data from the previous year and using minimum stock reserves.
2	Parts delivery	In addition to enough supply, things must be delivered quicker to clients.	Goods are sent using the land shipping method which takes longer than the required time	Logistics operations	On average, this occurs with each shipment of replacement parts to consumers.	The logistics division runs the delivery process	Land delivery is deemed more time-consuming; hence it will be paired with air shipment.
3	Troubleshooting time	Troubleshooting time needs technician qualification, adequate stock, and timely delivery.	Some customers require certified technicians from the manufacturer.	The scope of technician personnel	In 2021, government clients started to request engineer certification.	All the company's technicians	Manufacturers provide technicians with product training.
4	Order completion	Completion is measured from the date of the order to the date of invoicing.	Completion of orders affects the company's fund turnover.	Operational sales division	Monthly completion time evaluations are conducted for financial statements.	The financial division performed measurements on the technological division.	The other three indicators will have an impact on order completion times if they are improved.

3.3. Prioritizing RPN Number from FMEA Result

Performance in a more detailed form is developed into failures that may occur in the performance process of the engineering division of the company that is the object of research which is then re-evaluated the cause of the decline in performance from the engineering division, the main reference overall represents from the perspective of the Balanced Scorecard with the core performance experiencing a decline. , then every detail of the performance is calculated using an assessment of severity, occurrence and detection.

As part of the process of developing the FMEA analysis, three individuals were chosen to serve as resource persons in the FMEA working paper. High severity rankings were denoted with a red mark to indicate the necessity for immediate performance improvement. The severity ranking structure makes use of references to quantify qualitative efficiency is ranked according to the impacts on timetable, overall expenses, and technical issues that have an influence on the subsequent work unit. this ranking is performed and may be observed in Table 3.

Table 3. FMEA Rank Result

Process	Potential failure	Potential cause	S	O	D	RPN	Rank
Most consumed spare parts	Wrong type of spare part	No fast-moving stock analysis	7,67	8,00	9,00	552	1
Weekly analysis of stock quantity	Stock has decreased drastically without realizing it	No staff to analyze the amount of stock	7,67	7,67	9,00	529	2
Selection of expeditions by land	Delivery takes a long time	Only one expedition option.	6,67	7,67	8,67	460	3
Technician access data and manual book	Difficulty accessing with smartphone	Technicians are not equipped with laptops	8,67	7,67	5,67	399	4
Order stock to supplier	Late orders to suppliers	No orderable spare parts data	7,33	6,33	7,67	372	5
Technician certification	Not accepted by some customers	No manufacturer training and certification	8,67	8,33	5,00	361	6
All technicians can make repairs	Four people still can't make repairs	Lack of technicians to handle customer complaints	8,67	7,67	5,00	332	7
Monthly analysis of the minimum stock reference	Minimum quantity is not sufficient	There is no SOP for stock analysis	5,67	6,33	8,67	323	8
Measuring the dimensions of the parts	Wrong choice of expedition mode.	There is no reference to the mode of delivery	5,33	5,33	5,67	171	9

3.4. Dynamic Balanced Scorecard Approach

The changes that occurred during the pandemic crisis certainly forced organizational leaders to be able to formulate an adaptive change strategy and could see the cause and effect between performance indicators which in the end could become a reference and facilitate performance analysis both now and in the future.

Due to the widespread application of the balanced scorecard concept in a variety of industries, it will take a great deal of time to discuss it and involve a large number of parties in order to reach a conclusion; every party involved in the company is aware of the length of the process if it is to be properly implemented; there will be many successful implementations, but there will also be far more that do not meet expectations; in many manufacturing processes, getting the core of an item right can take a long time. The conceptual model of the Balanced Scorecard in Figure 4 is the conclusion of the BSC that is applied to the engineering division using a diagrammatic method that is easier to interpret because it is presented in a more varied manner, as well as this image as a reference to facilitate the making of causal loop diagrams of the Dynamic Balanced Scorecard to be used as a reference for future analysis in the technical division and other divisions within the organization.

The conceptual model of the Balanced Scorecard is a conclusion from the BSC that is applied to the engineering division with a diagramming method that is easier to interpret because it is presented more variedly, as well as this

image as a reference to facilitate the making of causal loop diagrams of the Dynamic Balanced Scorecard to be used as a reference to facilitate analysis in later in both the engineering division and other divisions within the company. As a unified whole to be able to become a reference for an organization in carrying out its daily functions, the BCS conceptual model will facilitate understanding in achieving performance to be achieved within the specified time period as a reference for conducting a review of the work process in times of crisis such as The Covid-19 pandemic period is a time when processes need to be aligned both within the division and as a whole organization. (Figure 4)

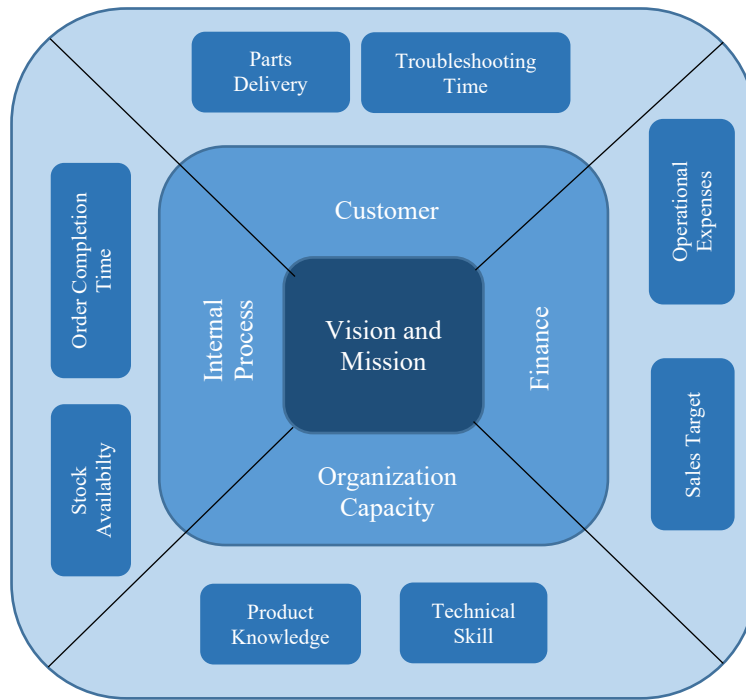


Figure 4. Balanced Scorecard Focus Indicators

Figure 5 depicts a causal link between the elements that drive performance, illustrating a conceptual model that stresses the interdependence between performance indicators, and illustrating the interdependence between performance indicators from four different perspectives.

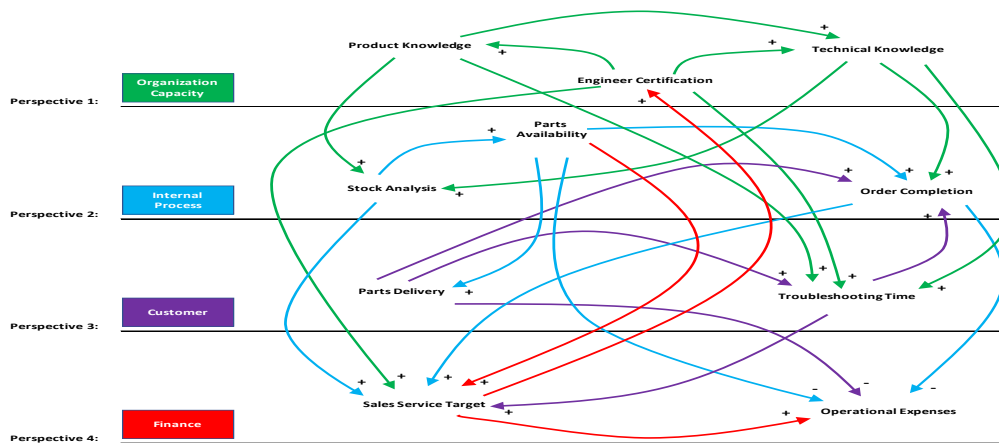


Figure 5. DBSC Causal Loop Map

As shown in the causality diagram example, stock analysis will have a positive effect on the availability of spare parts. Another important causality is that the delivery time of spare parts will have a positive effect on the time of problem solving. However, not every causality has a positive effect; air shipping will have a negative effect on the high operational costs. Table 4 explains the causality path in each perspective in greater detail.

Table 4. Partial Weight and Priority Weight of Each Row of Level 2 Elements (Criteria)

No	Causal Relationship	Ways	Agains To	Impact (+/-)
1	Product knowledge	→	Technical knowledge	+
2	Product knowledge	→	Stock Analysis	+
3	Product knowledge	→	Troubleshoot time	+
4	Engineer certification	→	Product knowledge	+
5	Engineer certification	→	Technical knowledge	+
6	Engineer certification	→	Sales target	+
7	Engineer certification	→	Troubleshoot time	+
8	Technical knowledge	→	Stock Analysis	+
9	Technical knowledge	→	Troubleshoot time	+
10	Technical knowledge	→	Order completion	+
11	Stock Analysis	→	Parts availability	+
12	Stock Analysis	→	Sales target	+
13	Parts availability	→	Waktu kirim suku cadang	+
14	Parts availability	→	Operational expenses	-
15	Parts availability	→	Order completion	+
16	Order completion	→	Sales target	+
17	Order completion	→	Operational expenses	-
18	Parts delivery	→	Order completion	+
19	Parts delivery	→	Troubleshoot time	+
20	Parts delivery	→	Operational expenses	-
21	Troubleshoot time	→	Sales target	+
22	Sales target	→	Operational expenses	+

The results of the analysis in 2021 based on the balanced scorecard indicate that from the four BSC perspectives analysis, namely, internal processes, customers, and finances as a whole, an evaluation of the performance of the main engineering divisions on six dimensions, namely, increasing knowledge and expertise with product knowledge indicators measured in percent units and in December 2021 achieving a score of 75% of the 70% target, so that it has a positive impact, was conducted. BSC results for the dimensions of increasing stock management with performance indicators of spare parts availability which are calculated in units of days, the average achievement in 2021 is 32 days from the 15-day target so there is a difference of -113% so it is declared not achieved. BSC results for the dimensions of increasing control orders with a performance indicator of order completion time which is calculated in units of days and the measurement results in 2021 are also deemed not achieved. In the dimension of increasing customer satisfaction with the spare parts delivery time indicator measured in days in 2021, an average value of 39 days is achieved with a target of 20 days, resulting in a -95 percent difference and results that do not meet the target, still on the same dimensions for the indicator. The average number of days required to solve an issue is 42, whereas the aim is 25; the difference is -68%, indicating that the goal is not met. (Table 5)

Table 5. Implementation Result March to June 2022

No.	Indicator	Average 2021	Average March-June 2022	Improvement
1	Parts availability	32,0	0,4	99%
2	Spare parts delivery	39,0	5,3	86%
3	Troubleshoot time	42,0	8,0	81%
4	Order completion	46,0	10,7	77%

5. Discussion

Based on the Balanced Scorecard analysis, the engineering division's performance shows that the area that needs to be improved is in the internal process perspective on the dimensions of improving stock management with spare parts availability indicators, and in the same perspective on the dimensions of increasing order control with order completion time indicators. Furthermore, two indicators that need to be addressed from the consumer viewpoint with the goal of boosting customer happiness are the delivery time of replacement parts and the time of issue addressing. Failure Mode Effect Analysis was used to successfully gather the reasons of the fall in performance indicators, and the performance items are now placed in order of importance. It is simpler to get an activity improvement plan from deteriorating performance indicators with causality between performance, which can be shown in its effect between positive and negative impacts, using the Dynamic Balanced Scorecard.

5.1. Implication

The contribution of this research is a description of suggestions for performance improvement with a very critical point in the analysis of the adequacy of spare parts as a fundamental factor that becomes an important component in the strategy where this research is conducted, and of course can be implemented in other places as a reference base for the company's strategic plan. The benefit of this research is anticipated to serve as a guide for medical device distribution companies, particularly the engineering division, in developing a performance improvement strategy during a crisis with the Dynamic Balanced Scorecard.

6. Conclusion

The performance assessment of the technical division of medical equipment distributors using the balanced scorecard viewpoint may be a reference for improvement for other businesses that are comparable, and the limitations of this study can be expanded in more research. It was not discovered in the prior literature that the Balanced Scorecard method combined with RCA and FMEA resulted in improvements in indicators of the technical division of medical equipment distributors. It is hoped that additional research will be carried out which might make the application of these techniques more effective. The DBSC model can easily shorten the time it takes to analyze performance improvement and can be used right away to adapt to the current situation. unpredictability resulting from elements that are present during crises like the Covid-19 pandemic outbreak.

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