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Application of Dynamic Systems to Model Increasing Profitability of UMKM Production in the "SENTRA IKAN BULAK"

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Abstract: The growth of UMKM in various sectors has triggered intense competition between these business actors. One of them is the craft sector. The use of social media is expected to boost turnover, but the benefits are still lacking. In the craft sector, the problem that arises on the MSME side is the cessation of production. This causes decreasing turnover and has an impact on reducing profits. This dynamic system modeling is used to see how profit-increasing strategies can be carried out. Based on the dynamic system, there are several variables, namely the Causal Loop Diagram (CLD) and the Stock Flow Diagram (SFD) that are built, there are 3 scenarios in increasing production profits, namely: increasing production, reducing the cost of tools and materials and lastly is taken simultaneously the first and second scenarios. From the simulation carried out, it was found that within a period of 12 months it was seen that increasing production by reducing the cost of tools and materials could increase sales so that income increased and profits increased. A process of identifying production process change variables is needed as one of the production process variables that was stopped.

Keywords: UMKM, Dynamic System, Production, simulation

INTRODUCTION

The role of MSMEs is very large for Indonesia's economic growth, with their number reaching 99% of all business units. In 2023, MSME business actors will reach around 66 million. The contribution of MSMEs reaches 61% of Indonesia's Gross Domestic Product (GDP) or equivalent to IDR 9,580 trillion. MSMEs absorb around 117 million workers (97%) of the total workforce (*UMKM Indonesia - KADIN Indonesia*, n.d.).Table 1 shows MSME Data 2018 - 2023

Table 1. The UMKM Data 2018 - 2023

Year	2018	2019	2020	2021	2022	2023
number of UMKM (million)	64.19	65.47	64	65.46	65	66
Growth (%)		1.98	-2.24	2..28	-0.70	1.52

This causes competition between business actors to become increasingly tight, so product innovation is needed. The use of information technology is carried out to increase efficiency and effectiveness of performance in order to survive in online business competition, such as the use of social media marketing as a promotional media for businesses that do have an impact on the development of the MSME market.

However, sometimes the impact of using social media is not significant. For this reason, marketing innovation needs to be identified more deeply so that decision making is right on target before its market share decreases (Aminudin et al., 2014; Fortunella et al., 2019; Romadhon & Suryani, 2020).

Narotama University is a campus that really cares about MSMEs. With the slogan of the MSME campus, Narotama University is determined to develop the potential of the fostered MSMEs. One of the fostered MSMEs is an MSME located in the Bulak Fish Center (SIB) Kenjeran Surabaya, namely the Firdaus shop. The Firdaus shop is one of the MSMEs in the field of crafts from shells, natural stone and wood located in the BULAK FISH CENTER, an area designated for MSMEs in the culinary, souvenir and shell craft fields located in the Kenjeran area of Surabaya. Figure 1 shows the location of the Firdaus shop and the Narotama University research team.

Figure 1. The Firdaus shop and the Narotama University research team.

Firdaus shop uses social media as its online marketing platform starting in 2019 and is a growing business. From the results of data mining, this business has achieved an average sale of 300 orders in the past year. However, the problem is that the profits obtained are very minimal. This is due to slow production and less intensive product marketing so that promotions are less efficient, business owners find it easier to market via WhatsApp Story and Facebook compared to other social media platforms. Based on revenue data in the past year, the average monthly turnover is less than Rp. 5,000,000.00 and the profit obtained is less than Rp. 500,000.00. This problem is the basis for the importance of proper product promotion in terms of increasing sales as well as profits for business actors.

This article discusses how to develop a strategy to increase profits using a dynamic system simulation model, so that a model is created that represents the existing conditions of production, sales, revenue, and profits. In achieving this, a dynamic model simulation will be created as an alternative to achieving the right sales and profitability targets. In the ongoing business process, there is a process from ordering to product delivery. This modeling uses a dynamic system application, and creates alternative scenarios to increase business profits. The best scenario is expected to help Galeri Firdaus to optimize profits.

METHODOLOGY

The development of a dynamic system simulation model was carried out to formulate a strategy for increasing productivity in order to increase profitability (Almamalik & Setyo Rukmi, 2023; Damara et al., 2021; Ima Dudin et al., 2020; Sriwana et al., 2020; Subiadi & Rauf, 2016). With the model scenario, it is expected to be able to increase the profit of Galeri Firdaus.

Figure 2 shows the stages of the research carried out. The first step to take is to understand the concept of dynamic systems. This step is done through a literature study on how dynamic system models are designed to increase profits in business. Next, conduct a needs analysis. This is done to understand the problems and solutions achieved through internal and external factors. The main problem is declining profits where even though there are sales, profits do not increase as expected. This problem can be caused by high production costs, uncompetitive selling prices, or unstable demand. The causative factors include production costs caused by raw material costs, labor, and other overhead costs.

The problem is divided into 2 parts, namely internal factors and external factors. Table 2 shows internal and external factors. Needs analysis was carried out on the Firdaus gallery UMKM to determine the business processes running on the UMKM. The business process at the Firdaus Store can be seen in Figure 3. Where customers will see the product directly in the display case or through the product brochure/display case. Once appropriate, an order will be made. then the product will be made/prepared. While preparing the product, customers are asked to pay for the order. After the order is completed and paid in full, the order will be delivered. And the process is complete.

After the needs analysis process is carried out, the next step is to carry out the data collection process. Data collection is carried out based on production, income, and profit data through document literature studies, observations, and interviews with business actors. The data helps the process of identifying the needs variables in the Gallery Firdaus business system. The needs analysis table can be seen in Table 3.

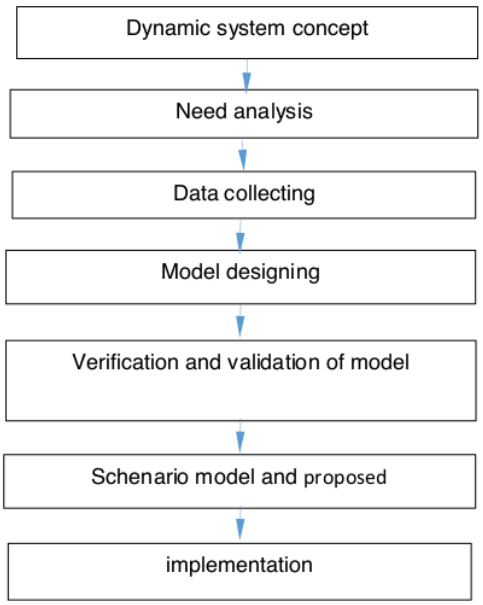

Figure 2. Research Step

Table 2. External and Internal Factors

No	Internal	External
1	Human Resources	Variation
2	Cost of Tools & Materials	Commercial cost
3	Cost of production	
4	Revenue	
5	Profit	

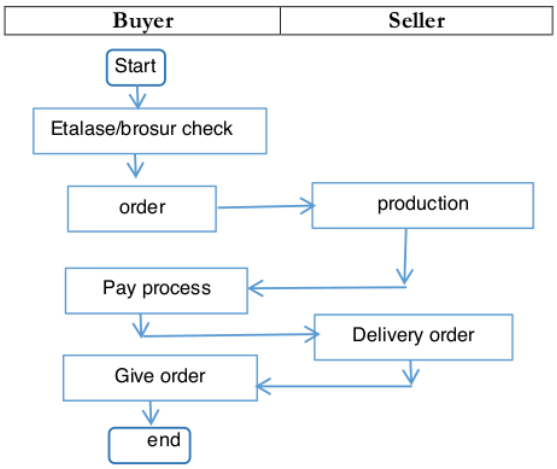

Figure 3. Business Process

RESULT AND DISCUSSION

4.1 Model Design

Causal Loop Diagram (CLD) is a diagram that describes the relationship between variables in a system using arrows and signs (+ or -) to indicate the direction and type of relationship (Suryani et al., 2016). Causal loop diagram (CLD) is arranged based on the variables in Table 2, so that the relationship and influence between variables are obtained which can be seen in Figure 4. CLD is created using a dynamic system application which is an application for creating concepts, documentation, simulation, analysis, and optimization of dynamic system models starting from creating causal loop diagrams or creating stock diagrams and flow diagrams (Almamalik, 2021; Trenggonowati et al., 2020). Efforts to increase profitability have 25 variables that influence each other, 3 balancing loops (B1, B2, B3) which are positive and negative relationships, and 2 reinforcing loops (R1, 15 R2) which are positive and positive relationships. B1 is the relationship between pending orders-production-delivery-outgoing products–pending orders. Delayed orders increase production, production increases delivery, delivery increases outgoing products, outgoing products reduce pending orders. The product output increases sales and revenue at R2, revenue increases profit at B2. B2 is the relationship between profit-production costs. Profit increases production costs, production costs and commercial costs decrease profit. B3 is the relationship between product price revenue, low product prices reduce revenue, low revenue increases product prices.

Table 3. The Need Analysis

No	Variable	Type	Unit
1	Product out	rate	pcs
2	Order level	rate	pcs
3	Order pending	level	pcs
4	Production	variable	pcs
5	Shipping	variable	pcs
6	Request	variable	pcs

7	Production Stopped	variable	day
8	Lack of tools and material	variable	day
9	change of production process	variable	day
10	damage	variable	day
11	sale	variable	pcs
12	Income/revenue	rate	rupiah
13	Product price	variable	rupiah
14	profit	level	rupiah
15	Cost of production	rate	rupiah
16	Cost of packing	variable	rupiah
17	Labor cost	variable	rupiah
18	Electricity cost	variable	rupiah
19	Cost of tools and material	variable	rupiah
20	Fuel cost	variable	rupiah
21	Cost of commercial	rate	rupiah
22	Cost of administration	variable	rupiah
23	Cost of marketing	variable	rupiah
24	cost of accessories	variable	rupiah

Material equipment costs reduce revenue, revenue increases product prices. Production stoppages reduce product output. Production stoppages are caused by lack of material equipment, changes in production processes, and damage to material equipment. The variables that affect pending orders and production are order levels. Packaging costs, labor costs, electricity costs, accessory costs, material equipment costs, fuel costs, and commercial costs increase production costs. Marketing costs and administrative costs increase commercial costs. R1 is the relationship between demand and order levels, demand increases order levels, order levels increase demand. R2 is the relationship between sales and revenue, sales increase revenue, revenue increases sales. The stock and flow diagram (SFD) as seen in figure 5 is created based on the CLD with the main variables in the form of sub-models for pending orders and profits, in accordance with the objectives of the simulation modeling. The types of variables refer to Table 3. The pending order sub-model illustrates that pending orders will increase based on order levels and decrease based on product output, as well as their effects on other variables. The profit sub-model illustrates that profits will increase based on revenue and decrease based on production costs and commercial costs, as well as their effects on other variables. Both sub-models can be seen in Figure 4.

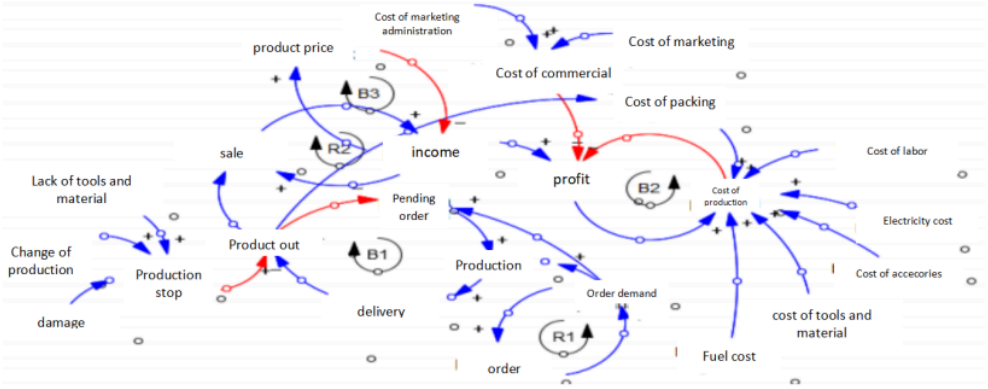

Figure 4. Causal Loop Diagram

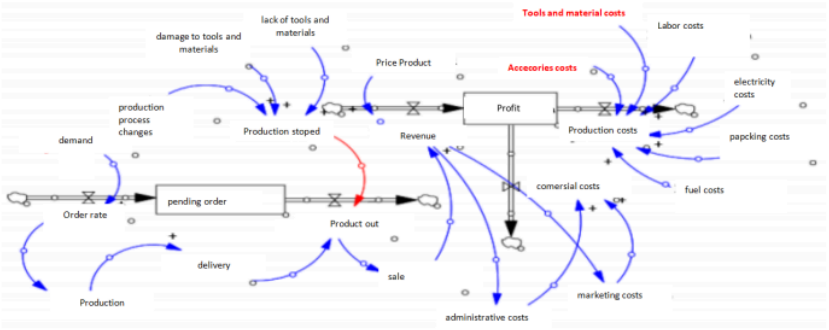

Figure 5. Stock Flow Diagram

Based on the relationship of variables in CLD and SFD, both sub models are connected to sales. Sales can increase revenue, revenue can increase profit, so this scenario becomes the final model in the simulation of the dynamic system of increasing profit or business profit of Firdaus Cafe which can be seen in Figure 6.

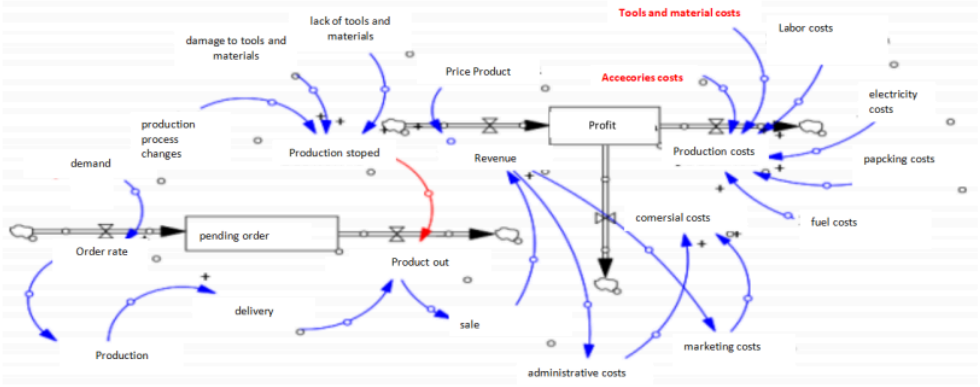

Figure 6. Final model of the dynamic system simulation

CONCLUSIONS

This study discusses profit-increasing strategies using a dynamic system simulation model, a model that represents the existing conditions of production, sales, revenue, and profit. Based on CLD and SFD simulations with Ventana Simulation, 3 scenarios were produced to increase production volume and reduce production costs through consideration of product selling prices. The results overcome the problems of production stops and material tools, so as to increase raw materials for the production process but still at affordable prices to reduce expensive material costs. Finally, it can increase revenue and profit higher. In the simulation, increasing production volume and reducing production costs have a higher value than before the scenario due to the increasing number of products and decreasing the number of costs

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Conflicts of Interest (Optional): This research was developed scientifically to support the development of UMKM through a dynamic system approach. There are no personal or commercial interests underlying it

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