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Analysis Of General Business Behavior In Implementing Marketing Mathematics In The Digital Era

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ABSTRACT
This study explores business behavior in applying marketing mathematics in the context of conventional and online businesses. The main distinction between these types of businesses lies in their promotional strategies, packaging adjustments, and methods of identifying customer numbers. This applied qualitative research employs observational data on business behavior and literature studies to support deductive reasoning for formulating decision-making theories. The analysis reveals the influence of business behavior in applying marketing mathematics, including: (1) identifying customer needs in conventional and online contexts, (2) utilizing graphs for decision-making, (3) adjusting packaging sizes to meet consumer needs, and (4) synchronizing marketing and production mathematics. Accurate estimations in this synchronization process significantly impact work instructions. These instructions detail real-time steps in the marketing phase, which subsequently guide production. This ensures minimal discrepancies between inventory inflows (production) and outflows (sales), reducing stockpiling and optimizing working capital, particularly for food and beverage entrepreneurs. Unlike artificial intelligence (AI), effective work instructions remain a critical business strategy, incorporating Strengths, Weaknesses, Opportunities, and Threats analysis across divisions. The unique interrelation between production and marketing divisions highlights the irreplaceable human element in crafting responsive strategies, making this process essential for achieving business efficiency and reducing operational waste.

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INTRODUCTION

The ability to compete in marketing is a key aspect that determines the success or failure of a business. Therefore, marketing management becomes a crucial element that every entrepreneur must consider when formulating strategic steps integrated within the company's strategic management. According to Rinaldi and Ferry (2015), marketing management is a tool to analyze, plan, implement, and control programs designed to create, build, and maintain mutually beneficial exchange relationships with target markets. The goal is to achieve the company's primary objective of generating profits. In an increasingly digitized

world, this approach is becoming more relevant, especially with the advent of big data and digital analytics that allow entrepreneurs to make more precise marketing decisions.

In the world of marketing, various strategies encompass business competition among companies. Based on their market position, there are three main categories: market leader, market challenger, and market follower. Fryandiswastiko (2016) explains that market leaders are typically reactive by adjusting prices and competing, as well as proactive by developing markets and conducting research and development. Market challengers are reactive by following the market leader (follow the leader) or using a "me too" strategy, and proactive by launching attacks, challenges, and new product innovations. Meanwhile, market followers are reactive by maintaining the status quo and using "me too" strategies and proactive by seeking new markets or segments, including a market niche strategy.

Strategic thinking involves the ability to plan for the future, including decisions to be made, budget allocation, necessary preparations, and priorities to be addressed. Sabariah and Etika (2016) state that strategic thinking involves analyzing what is happening, why it is happening, where and when an event occurs, to then determine the appropriate actions. In the digital era, strategic thinking not only includes intuition but also integrates technology and analytics, such as the application of marketing mathematics to predict customer needs and market trends.

One important component in formulating business strategies is the use of management accounting, which provides data and information for internal parties, especially managers at various organizational levels (Pelitawati & Kusumawardana, 2020). Accurate and relevant data serves as the basis for effective strategic decision-making, including designing digital-based marketing campaigns.

In the digital era, competition between conventional and online businesses is intensifying. The density of conventional businesses is visible in the close proximity of stalls or stores offering similar products, while online business competition is evident from the high activity on various e-commerce platforms such as TikTok, Facebook, Instagram, or other e-commerce websites. The main difference between conventional and online businesses lies in their promotional strategies. Conventional businesses typically leverage specific moments or physical locations for promotion, and those with substantial capital may use advertisements. Conversely, online businesses can conduct more intensive promotions at relatively lower costs through their digital platforms. However, some online businesses still utilize social media or television to reach a broader audience, such as Tokopedia, which continues to advertise on television. In this context, the application of marketing mathematics becomes a critical tool to identify customers and potential customers more precisely.

Aside from differences in promotion, these two types of businesses also differ in identifying customers and potential customers. According to Hanafi et al. (2018), to achieve sustainable competitive advantage, companies must adapt to changes in external trends, events, and internal capabilities, as well as formulate, implement, and evaluate key strategies effectively. In the digital era, this adaptation includes the ability to leverage data and technology in developing analytics-based marketing strategies.

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In today's digital era, business competition is increasingly fierce in both conventional and online sectors. Digitalization has transformed the way companies operate, market products, and interact with customers. With technological advancements, entrepreneurs are required to integrate data-driven approaches in decision-making, particularly in marketing. One relevant approach is the application of marketing mathematics, which enables entrepreneurs to analyze data, identify trends, and formulate more measurable and effective marketing strategies.

The growing number of entrepreneurs, whether in the form of physical stores or through online platforms, has created highly dynamic competition. Conventional businesses face challenges in retaining customers amidst the rising popularity of e-commerce, while online businesses must continuously innovate to reach customers in an increasingly saturated market. In this context, the application of marketing mathematics becomes crucial in helping entrepreneurs optimize resources, understand customer needs, and create more efficient promotional strategies. Furthermore, literature on business behavior in applying marketing mathematics remains limited, especially those discussing the integration of conventional and online businesses in the digital era. This research is essential to address this gap by providing a comprehensive understanding of how entrepreneurs utilize marketing mathematics to enhance competitiveness, both in physical and digital markets.

The urgency of this research also lies in its relevance to the development of Indonesia's digital economy, which continues to show significant growth. The findings of this study are expected to provide practical contributions to entrepreneurs in adopting data-driven strategies and offer academic insights valuable for the development of marketing studies in the digital era. Thus, this research becomes highly important in helping entrepreneurs face challenges and seize opportunities in an ever-evolving business landscape.

METHODS

This research employs a qualitative approach with an applied research type. The approach aims to deeply understand the phenomena occurring in business behavior, particularly the application of marketing mathematics by entrepreneurs in the digital era. Primary data is collected through direct observations of various marketing actions and strategies employed by entrepreneurs, both through social media and conventional means. These observations are conducted to identify marketing behavior patterns that may support or hinder business competitiveness.

In addition to direct observation, the research also utilizes secondary data obtained through literature studies. The literature review examines relevant sources, especially those related to how entrepreneurs leverage communication technology to support marketing strategies. This approach aims to strengthen the analysis with references from previous relevant studies and to understand the theoretical framework underlying the implementation of marketing mathematics in various business contexts. Economists, as explained by Ismawan, MF, et al. (2016), generally use a deductive approach to solve complex economic problems, both at the partial and aggregate levels. This deductive approach is highly relevant to this research, as marketing decision-making involves complex considerations. By

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employing deductive reasoning, decision-making theories can be formulated to create a balance between goods produced and goods sold, thereby supporting marketing efficiency.

Based on this, the study leverages deductive reasoning to understand the equilibrium point in marketing, particularly in the digital and conventional contexts. This reasoning is applied to analyze how entrepreneurs formulate optimal marketing strategies, including stock management, goods distribution, and efforts to boost sales through digital platforms.

The field of marketing mathematics, which encompasses the analysis of balance between incoming and outgoing goods, is continuously evolving and remains ever-relevant. Thus, this study not only seeks to understand the phenomena occurring but also aims to develop new concepts that can provide practical contributions to entrepreneurs in enhancing their competitiveness. During data collection, observations of business behavior phenomena are conducted to explore differences in strategies between conventional and online entrepreneurs. These observations cover how entrepreneurs utilize social media, manage promotions, and respond to customer needs. As a result, the data obtained can provide a comprehensive overview of marketing practices in the digital era.

Data analysis is conducted using a deductive approach, linking relevant theories with field findings. This approach enables researchers to formulate solutions grounded in theoretical foundations and relevant to real-world practices. The analysis techniques also include expert judgment, where field findings are analyzed based on expert perspectives to ensure the validity and reliability of the research results. As part of the analysis, this research also examines the implications of marketing mathematics in supporting sustainable economic growth. By enhancing market potential analysis capabilities, entrepreneurs are expected to formulate strategies that not only benefit their businesses but also contribute to general economic equity.

The analysis results will be interpreted based on the observed phenomena, both in conventional and online businesses. The researcher will integrate empirical findings with relevant theories to answer the research questions and provide practical recommendations. This approach is expected to yield significant contributions to the development of marketing strategies in the digital era.

RESULTS AND DISCUSSION

Implementation of Marketing Mathematics

As is widely known, many entrepreneurs utilize communication technology to identify customers and establish emotional bonds with them. Based on the researcher's observations, several patterns of marketing mathematics implementation are employed by entrepreneurs across various business sectors, both conventional and online.

1. Entrepreneurs in the Pharmaceutical and Medical Equipment Sector (Pharmacists)

Pharmacists provide medicine delivery services accessible via WhatsApp as part of their marketing strategy. This approach enables them to reach individuals who need medicine delivery without requiring a specialized application. This service is highly effective for specific demographics, such as the elderly, pregnant women, parents with young children or individuals with special needs, and patients who face mobility challenges. Additionally, it is

relevant for regions with heavy traffic or remote locations. Marketing mathematics is applied to record the number of patients with specific characteristics who use this service, assisting pharmacists in identifying loyal customers and fostering mutually beneficial relationships that enhance customer loyalty.

2. Entrepreneurs in the Culinary Sector

Culinary businesses selling products both conventionally and online, such as pizza, burgers, and Hoka Bento, require customers to order through their proprietary applications. Customer data, such as names and phone numbers, is stored in a database for customer identification purposes. Marketing mathematics is employed to analyze the data of frequent customers, enabling entrepreneurs to offer promotions tailored to customer characteristics, such as reward points or specific purchase thresholds. Moreover, data analysis helps determine the most popular menu items, allowing production policies to align with market demand.

3. Entrepreneurs in the Food and Beverage Souvenir Sector

Souvenir entrepreneurs, typically operating conventionally, record information such as buyers' names, phone numbers, and origins. Marketing mathematics is used to identify regular customers and analyze the significant number of customers from specific regions. This analysis aids entrepreneurs in determining market potential in other areas and deciding on the opening of new branches based on consumer preferences.

4. Entrepreneurs in Online Retail

Online entrepreneurs utilize more complex forms of marketing mathematics than their conventional counterparts. Examples include:

a. Visitor Statistics Identification
   Analyzing data from website or e-commerce application visitors helps measure the number of potential buyers, duration of visits, and user activity. Each visit generates revenue in the form of credits that enter the digital system.
b. Points Collection
   The points system motivates consumer shopping and indirectly recruits customers as "sales agents" at no additional cost, as they assist other potential buyers less familiar with technology.
c. Promotional Price Mathematics
   Large-scale promotional strategies, such as discounts, increase the number of visits to online stores. While promotional pricing reduces profit margins per product, revenue from consumer visits compensates for the associated costs.

In the manufacturing world, each production increase adds cost (marginal cost), while in the digital world, the additional cost of reaching more customers approaches zero (Rhenald Kasali, 2017). Technology also enables real-time analysis of customer needs, allowing entrepreneurs to fulfill consumer desires quickly and efficiently (Clayton M. Christensen, 2017). These theories reinforce how marketing mathematics functions, particularly in online businesses, by supporting data-driven, real-time decision-making to meet market needs optimally.

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Marketing Mathematics Review with Graphs

Marketing mathematics patterns often used by entrepreneurs typically involve summarizing data from various sources, such as sales, complaints, returns, testimonials, visits, orders, and cancellations. These summaries are then visualized through graphs tailored to their respective conditions.

Line or Area Chart

Figure 1. Line or Area Chart Pattern

This type of chart is commonly used to identify increases, decreases, or constancy in sales trends for a specific product in online sales. Observations are made over a consistent duration of time, focusing on the frequency of intensity (e.g., how many consumers view a product within the same timeframe).

The graphical representation depicts the number of visits by potential customers within a simultaneous time frame when they access the online sales application to view the product. This visualization indicates trends. This graph model is typically applied to online sales platforms such as YouTube, Instagram, TikTok, Facebook, and other online sales applications.

However, implementing this graph in conventional businesses during events like clearance sales or massive discount programs is more challenging. It is difficult to quickly estimate how many customers purchase the same product at a cashier simultaneously. Nevertheless, this graph can be applied in conventional businesses in pre-order contexts. For example, in the culinary industry, busy establishments often provide a single-menu booklet for customers to write their orders. This enables chefs to prepare multiple orders of the same dish simultaneously, improving efficiency.

Sparklines

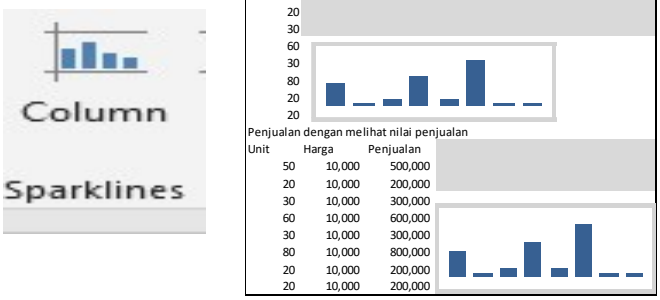

Figure 2. Sparklines Pattern

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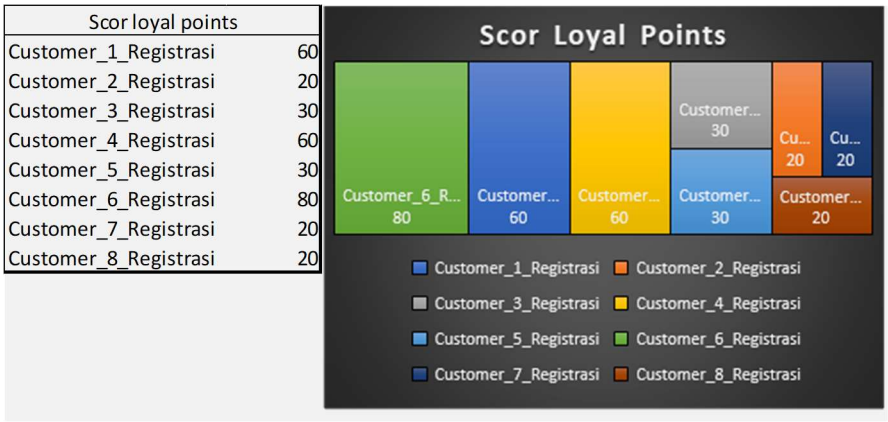
This graph model is typically used to identify increases, decreases, or constancy in real sales (confirmed sales) of a specific product. It applies to both conventional and online sales during the ordering and payment phases. The graphical representation displays the value of sales for a single product in a single column. It measures sales performance by calculating the product of price and quantity sold over time or by measuring the number of units sold over time.

Hierarchy Chart



Scor loyal points	
Customer_1_Registrasi	60
Customer_2_Registrasi	20
Customer_3_Registrasi	30
Customer_4_Registrasi	60
Customer_5_Registrasi	30
Customer_6_Registrasi	80
Customer_7_Registrasi	20
Customer_8_Registrasi	20

Figure 3. Hierarchy Chart Pattern

This graph model is commonly used to identify individual customer loyalty scores based on their registration numbers. Customers who achieve specific purchase scores become eligible for rewards from companies using online sales. Rewards may include free shipping, vouchers, or raffle numbers entered into a lottery machine.

Analyzing Marketing Mathematics Through Packaging Dimensions in Practical Methods Applied by Entrepreneurs

Marketing mathematics extends beyond identifying the number of customers, potential customers, and promotions; it is also applied in packaging dimensions. Entrepreneurs use this approach to cater to different consumer behaviors characterized by buying in large, medium, or small quantities. This strategy enables entrepreneurs to capture all three consumer types, a long-established market tactic, particularly in the food and beverage sectors. This method prevents purchase cancellations due to mismatched portion needs. In this case, marketing mathematics focuses solely on the geometric dimensions of packaging.

Synchronizing Marketing Mathematics and Production Mathematics in Applied Methods

Production management plays a crucial role in coordinating activities to achieve objectives. Decisions related to production management include:

a. Product design policies.
b. Transformation process policies.
c. Continuous improvement of operational systems (Riadi, Muchlisin, 2016).

Business Process Requirements (Marcelino & Wehartaty, 2018):

a. Business processes must have clear boundaries, inputs, and outputs.
b. Activities within business processes should follow a sequence in space and time.

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c. Results must have a recipient (customer).
d. Business processes must add value for the recipient.
e. Business processes must be integrated with the organizational structure.
f. Processes can involve multiple work units, not limited to a single unit.

The theoretical foundation highlights that production and marketing actions must support each other to prevent overproduction or shortages, ensuring customer satisfaction. Synchronization between marketing and production mathematics involves aligning on a marginal level. Proper estimation minimizes discrepancies between goods entering (produced) and goods exiting (sold). This synchronization is especially critical in culinary businesses during peak order times, where accurate estimation prevents stockouts or overproduction, which could otherwise reduce working capital.

Synchronization issues frequently occur among small entrepreneurs, particularly in the culinary sector, such as:

a. Ice cream vendors maintaining the same production level during summer and rainy seasons.
b. Gado-gado vendors boiling large quantities of vegetables during peak sales times.
c. Traditional snack vendors producing equal portions of all snack types.
d. Fried snack vendors overproducing during peak sales hours.

These synchronization errors accelerate working capital depletion for small entrepreneurs. Large-scale manufacturers experience slower capital depletion due to their product's shelf life, allowing time for adjustments between production and marketing mathematics.

Intelligent estimation and synchronization of marketing and production mathematics influence work instructions, which are more detailed than procedures and specific to individual tasks, equipment, or activities. Work instructions adapt to real-time conditions in marketing spaces, followed by production adjustments. Key Characteristics of Effective Work Instructions (Soemohadiwidjojo, AT, 2018):

a. Adaptability to real-time marketing conditions.
b. High analytical skills for larger businesses.
c. Integration of field surveys and specific production-marketing reconciliation within mathematical frameworks, such as matrix mathematics.

Despite advancements in technology, including artificial intelligence (AI), accurate work instructions remain irreplaceable due to their reliance on human strategic planning. Proper work instructions incorporate SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), especially in the correlation between production and marketing divisions, ensuring a competitive edge in complex business environments.

CONCLUSION

Business competition is evident in the intensive efforts of entrepreneurs to create superior strategies. The primary difference between conventional and online businesses lies in their approaches to promotion, packaging adjustments to meet consumer needs, and identifying the number of customers and potential customers. The interrelation of these elements reflects

how entrepreneurs apply marketing mathematics to achieve efficiency and competitiveness. For instance, customer identification is conducted through data analysis, either directly in conventional businesses or via technology-based systems in online businesses. This data is then analyzed using various models, such as sales trend graphs or customer loyalty hierarchies, which help entrepreneurs understand consumer behavior and adjust marketing strategies in real time. Furthermore, the synchronization between marketing and production mathematics is also a key to success. Entrepreneurs, particularly in the food and beverage sector, use intelligent estimation to balance the goods produced with those sold, preventing stockpiles or product shortages. This process is supported by detailed work instructions, developed based on SWOT analysis to ensure coordination between the production and marketing divisions. While artificial intelligence technology continues to evolve, strategic decision-making based on in-depth analysis remains a human domain. By integrating marketing and production through this approach, entrepreneurs can enhance operational efficiency while maintaining a competitive edge in an increasingly intense business landscape.

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