International Journal of
Economics Development Research, Volume 5(1), 2024
pp. 433-448

Forecasting Analysis for Production Planning

Bobi Krisman Berkat Gulo[1], Serniati Zebua[2],
Aferiaman Telaumbanua[3]

Abstract:

The furniture industry plays a pivotal role in the economy by contributing to employment and meeting household needs. Effective production planning and forecasting are crucial for furniture manufacturers to navigate market uncertainties and optimize resource utilization. This study focuses on "Forecasting Analysis and Production Planning for Furniture at UD. Bersaudara, Gido District, Nias Regency," aiming to address production challenges related to demand variability and raw material management. Using a quantitative descriptive approach, data was collected through observation, unstructured interviews, and documentation at UD. Bersaudara. Sales forecasting was conducted using the Moving Average method, demonstrating its effectiveness in estimating future furniture sales. The results highlight the importance of accurate forecasting in mitigating production inefficiencies and ensuring optimal inventory management. Key findings underscore the significance of integrating information systems, staying attuned to market trends, and providing training for personnel involved in forecasting and production planning. By adopting suitable forecasting methodologies and enhancing operational strategies, UD. Bersaudara can enhance production efficiency, minimize inventory risks, and bolster competitiveness in the furniture market.

Keywords: *Furniture Industry, Production Planning, And Sales Forecasting*

1. Introduction

The development of the industrial world has undergone significant transformation in recent decades. The manufacturing industry, including the furniture industry, has become one of the important sectors in a country's economy. The furniture industry contributes significantly to job creation, economic growth, and meeting household needs. In facing global competition, it is crucial for companies in this sector to continuously develop efficient production strategies and processes to meet market demand effectively (Stachowiak & Pawłyszyn, 2021).

[1]*Universitas Nias, Indonesia.* bobigulo95@gmail.com
[2]*Universitas Nias, Indonesia.* sernizebua97@gmail.com
[3]*Universitas Nias, Indonesia.* aferiaman.tel@gmail.com

Production planning and forecasting analysis are critical aspects of operational management. Production planning involves organizing resources and production time to prepare raw materials and meet market demand as efficiently as possible. Meanwhile, forecasting analysis involves using historical data and statistical methods to estimate future demand. The combination of these two approaches can help companies avoid overproduction or underproduction, optimize inventory, and improve customer satisfaction.

According to (Buganová & Šimíčková, 2019), forecasting is an art and science of predicting future events. Forecasting is an essential part of every company or business organization in making management decisions. Production management always uses demand forecasting in planning related to consumer needs, workforce planning, production capacity planning, facility layout planning, location determination, and production scheduling.

Frequent consumer complaints about the lengthy furniture production process, caused by a lack of raw material inventory, result in preparations before processing into finished materials, ultimately reducing customer satisfaction. This is due to uncertain production demand, forcing management to require overtime from employees, which is a loss for the company (Özkan & Salepçioğlu, 2022).

Conversely, producing too many products can lead to warehouse accumulation, reducing product quality and rendering the products unsellable, necessitating re-production. Therefore, forecasting is needed before starting the production process. Forecasting is a quantitative technique or method for predicting future events, requiring past data as a reference. One benefit of sales forecasting is accurately predicting sales over time, enabling the creation of production plans in line with sales estimates (Bhavin et al., 2021).

Sales forecasting data can be used as a basis for production planning to prevent overproduction, which causes idle capital, or underproduction, resulting in lost sales opportunities. Forecasting helps companies achieve their goals and make production decisions, even though forecasts may not be entirely accurate. Forecasting is crucial as a guideline for planning.

The furniture industry often faces challenges in optimizing production processes and supply chain management (raw materials). These challenges relate to market demand fluctuations, raw material changes, or other factors affecting production efficiency. In this context, forecasting analysis and production planning are key to maintaining smooth operations and meeting market needs (Nolte et al., 2020).

UD. Bersaudara, a furniture production company in Nias Regency, faces unique challenges in managing production processes. Demand variability, raw material supply fluctuations, and local market dynamics can impact the company's performance. Therefore, accurate forecasting analysis and proper production planning are essential to address these challenges (Hernaus et al., 2020).

The furniture industry tends to experience high demand fluctuations. Demand can vary based on seasons, lifestyle trends, fashion trends, and other factors. This variability can make it challenging for companies to forecast and plan production accurately. Inaccurate demand forecasting can lead to overproduction or underproduction, affecting production efficiency and inventory management. Raw material supplies, such as wood, metal, or other materials used in furniture production, can also fluctuate. Factors like weather, local market availability, and external factors such as changes in international trade policies can impact supply (Linton & Klinton, 2019). These fluctuations can cause production delays or increased production costs if raw materials are not stably available.

The furniture market can be influenced by changing trends and preferences locally and internationally. Lifestyle changes, design trends, and cultural factors can affect product demand. Additionally, currency exchange rate fluctuations and changes in international trade policies can affect product competitiveness in export markets. Another challenge faced by production companies is the ability to quickly adjust production processes to changes in demand or supply conditions. Inflexibility in adjusting production to demand fluctuations can lead to imbalances between inventory and demand and increased risk of losses (Oliva et al., 2019).

Poorly managed inventory can result in high storage costs and the risk of products expiring or becoming damaged. In facing demand and supply fluctuations, companies need to develop efficient inventory management strategies to balance product availability and storage costs. As competition intensifies, companies must maintain product quality and continue to innovate to meet market needs (Oliva et al., 2019).

UD. Bersaudara often experiences production problems due to uncertain demand. Sometimes demand exceeds production, while other times production exceeds demand. Another issue the company faces is the lack of necessary raw materials for furniture production. This occurs because UD. Bersaudara produces without planning. Therefore, a forecasting method is needed to

analyze future demand and streamline the existing production system at UD. Bersaudara.

Initial observations indicate that UD. Bersaudara's problems stem from the absence of regular forecasting and production planning, inability to analyze demand, lack of efficient production process planning, difficulty in adjusting production capacity, and insufficient availability of necessary raw materials (Chatterjee et al., 2021).

Based on the above background, the researcher aims to scientifically examine the issues and is interested in studying "Forecasting Analysis and Production Planning for Furniture at UD. Bersaudara, Gido District, Nias Regency."

A problem can be defined as a gap or difference between the desired results and the actual outcomes. By understanding the problem, actions can be taken precisely and in line with the issue at hand. Based on the background described above, the researcher formulates the following problems:
1. How is the sales forecasting for furniture at UD. Bersaudara in Gido District, Nias Regency?
2. How is the production planning for furniture at UD. Bersaudara in Gido District, Nias Regency?

The objectives of conducting this research are as follows:
1. To understand how sales forecasting is carried out for furniture at UD. Bersaudara in Gido District, Nias Regency.
2. To understand how production planning is conducted for furniture at UD. Bersaudara in Gido District, Nias Regency.

3. Theoretical Background

Forecasting

Forecasting is the process of estimating future events based on historical data and trend analysis. In the context of furniture production, forecasting is used to determine the necessary production quantities for upcoming periods to meet market demand effectively. Common forecasting methods include quantitative and qualitative approaches. Quantitative methods, such as time series analysis and causal methods, are often used because they rely on historical data to make future projections. On the other hand, qualitative methods, such as the Delphi method and market research, depend on subjective assessments from experts and consumer opinions (El Idrissi et al., 2023).

Production Planning
Production planning is the process of determining the quantity and schedule of production to ensure that goods are produced in accordance with market demand and production capacity. Production planning involves various aspects, such as capacity planning, production scheduling, inventory management, and quality control. Several approaches in production planning include Just-in-Time (JIT), Material Requirements Planning (MRP), and Lean Manufacturing. Effective planning can reduce production costs, optimize resource usage, and enhance customer satisfaction (Özkan & Salepçioğlu, 2022).

Furniture Industry
The furniture industry is a manufacturing sector focused on producing various types of household and office furniture. This industry has specific characteristics, such as high product variation, different product life cycles, and highly fluctuating demand. Production planning in the furniture industry must consider design aspects, raw materials, manufacturing processes, and market trends. Product quality and design innovation are key factors influencing competitiveness in this industry (Manurung & Kurniawan, 2022).

3. Methodology

This study employs a quantitative descriptive approach involving the collection and analysis of numerical data and statistics. This method is used to measure, test hypotheses, and make generalizations about a specific population. According to (Ridwandono & Subriadi, 2019), quantitative data is grounded in a positivistic approach, using concrete data measured through statistics. Descriptive quantitative research aims to gather information about the existing status of phenomena (El Idrissi et al., 2023).

The research variables are attributes or objects that exhibit variation, focusing on production forecasting and planning (Hatch & Farhady in (Bhavin et al., 2021)). The study population consists of all employees at UD Bersaudara, totaling seven individuals. According to (Wicaksana & Isfania, 2022), a population encompasses all possible values of characteristics being studied. The sample taken is the entire population, comprising these seven employees, thereby ensuring it is representative of the whole population (El Nsour, 2021). Data collected for this study includes both primary and secondary data. Primary data is obtained directly from the first-hand source at the research site through observation and unstructured interviews. Secondary data is obtained from secondary sources such as company documents, sales reports, and interviews with UD Bersaudara's manager. Secondary data includes sales data from the past year used to support research analysis.

Data collection techniques involve observation, unstructured interviews, and documentation. Observation entails direct observation of sales data at UD Bersaudara, while unstructured interviews allow respondents the freedom to express their views. Documentation involves collecting written documents, photographs, audio, and video related to sales data to support analysis.

Data analysis is conducted using mathematical methods such as time series analysis, including Moving Average and Exponential Smoothing methods. Moving Average calculates the average value from historical data to estimate the next period's value. Exponential Smoothing assigns greater weight to recent data, considered more relevant in making forecasts. This research is conducted at UD Bersaudara located in Hilizoi Village, Gido District, Nias Regency.

4. Empirical Findings/Result

In this study, the analysis of control uses the Moving Average and Exponential Smoothing methods to determine the forecasting and planning of required raw materials.

1. Moving Average

In this research, data related to the forecasting and planning of raw materials needed by UD. Bersaudara were obtained to ensure that customer demands are consistently met. The sufficiency of these raw materials is essential to avoid losses due to excessive production costs and to ensure that customer requests are fulfilled within the target timeframe (Roblek et al., 2021).

One of the reasons for the shortage of raw materials at UD. Bersaudara is sudden customer demand, leading to shortages or depletion of wood stock. To anticipate these shortages, UD. Bersaudara uses the Moving Average method for forecasting and planning raw materials. Moving Average is a business forecasting method that calculates the average of a time series value and is used to estimate values for the next period based on historical data (Walter, 2021).

The Single Moving Average for period t is the average value for the latest n data. With each new data point, the new average can be calculated by removing the oldest data and adding the newest data. This method predicts values for the next period, typically every three months.

Data on furniture sales provided/produced by UD. Bersaudara were collected from employees, including:

Table 1. Types of Furniture Produced

No.	Type of Furniture	Raw Material	Customers/Consumers
1	Cabinet	Reng and board	Household, school & office
2	Desk	Reng and board	Household, school & office
3	Chair	Reng and board	Household, school & office
4	Bed	Reng and board	Household
5	Door Cousin	Reng/beam	Household, school & office
6	Window Cousin	Reng/beam	Household, school & office
7	Door Leaf	Board	Household, school & office
8	Window Leaf	Board	Household, school & office

Source: UD. Bersaudara (2023)

These types of furniture represent customer demands in varying quantities. The sales data obtained from UD. Bersaudara for a 3-month period are as follows:

Table 2. Sales Data for Period 1 (3 months) Year 2023

Month	Sales (Units)	Forecast (Units)
January	75	-
February	92	-
March	85	-
April	?	-

Source: UD. Bersaudara (2023)

From the above data, it is known that customer demand varies each month. This demand includes various types of furniture available and produced by UD. Bersaudara. In January, sales were 75 units, increasing to 92 units in February, and slightly decreasing to 85 units in March.

Next step: estimating and planning sales for the next month, which is April, to determine the quantity provided so that employees can estimate the reng and board raw materials needed (Buganová & Šimíčková, 2019).
Calculation:
Sales Forecast for April 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA April = (75 + 92 + 85) / 3

MA April = 252 / 3
MA April = 84

From this calculation, the estimated sales for April are approximately 84 furniture units.

To determine the forecast and sales planning for May, the researcher has received actual sales data for April from employees, which is 81 units. Therefore, the calculation is as follows:

Next:
Sales Forecast for May 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA May = (92 + 85 + 81) / 3
MA May = 258 / 3
MA May = 86
With this calculation, the estimated furniture sales for May are around 86 units. Based on this calculation, the estimated sales for June are around 83 furniture units, as shown in the following table:

Table 3. Sales Data and Forecasts

Month	Sales (Units)	Forecast (Units)
January	75	-
February	92	-
March	85	-
April	81	84
May	?	86
June	?	83

Source: UD. Bersaudara (2023)

From the above calculation, the estimated sales for April are 84 units, for May are 86 units, and the estimated sales for June are 83 units of furniture.

2. Sales Data and Forecasting Results for Period 2 (Second)
To determine forecasting and sales planning for the next period, the researcher obtained sales data from UD. Bersaudara from April to June 2023:

Table 4. Sales Data for Period 2 (3 months) Year 2023

Month	Sales (Units)	Forecast (Units)
April	80	-
May	83	-
June	80	-
July	?	

Source: UD. Bersaudara (2023)

From the above data, it is known that customer demand varies each month. This demand includes various types of furniture available and produced by UD. Bersaudara. From the data above, it is known that sales were 80 units in April, increasing to 83 units in May, and slightly decreasing to 80 units in June.

Next step: estimating and planning sales for the next month, which is July, to determine the quantity provided so that employees can estimate the reng and board raw materials needed.

Calculation:
Sales Forecast for July 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA July = (80 + 83 + 80) / 3
MA July = 243 / 3
MA July = 81

From this calculation, the estimated sales for July are approximately 81 furniture units.

To determine the forecast and sales planning for August, the researcher has received actual sales data for July from employees, which is 81 units. Therefore, the calculation is as follows:

Sales Forecast for August 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA August = (83 + 80 + 80) / 3
MA August = 243 / 3
MA August = 81
With this calculation, the estimated furniture sales for August are around 81 units. Based on this calculation, the estimated sales for August are around 81 furniture units, as shown in the following table:

Table 5. Sales Data and Forecasts

Month	Sales (Units)	Forecast (Units)
April	80	-
May	83	-
June	80	-
July	81	81
August	?	81

Source: UD. Bersaudara (2023)

From the above calculation, the estimated sales for July are 81 units, for August are 81 units, and the estimated sales for September are 81 units of furniture.

3. Sales Data and Forecasting Results for Period 3 (Third)

To determine forecasting and sales planning for the next period, the researcher obtained sales data from UD. Bersaudara that showed increased sales due to increased unavoidable customer demand, making the forecasts planned in the previous period very helpful for UD. Bersaudara in producing furniture. Below is the sales data from July to September 2023:

Table 6. Sales Data for Period 3 (3 months) Year 2023

Month	Sales (Units)	Forecast (Units)
July	84	-
August	83	-
September	85	-
October	?	

Source: UD. Bersaudara (2023)

From the above data, it is known that customer demand varies each month. This demand includes various types of furniture available and produced by UD. Bersaudara. From the data above, it is known that sales were 84 units in July, decreasing to 82 units in August, and increasing slightly to 85 units in September.

Next step: estimating and planning sales for the next month, which is October, to determine the quantity provided so that employees can estimate the reng and board raw materials needed.

Calculation:
Sales Forecast for October 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA October = (84 + 83 + 85) / 3
MA October = 252 / 3

MA October = 84
From this calculation, the estimated sales for October are approximately 84 furniture units.

To determine the forecast and sales planning for November, the researcher has received actual sales data for October from employees, which is 87 units. Therefore, the calculation is as follows:

Next:
Sales Forecast for November 2023 using the Moving Average formula:
MA = (n1 + n2 + n3 = ...) / n
MA November = (83 + 85 + 87) / 3
MA November = 255 / 3
MA November = 85

With this calculation, the estimated furniture sales for November are around 85 units. Based on this calculation, the estimated sales for December are around 86 furniture units, as shown in the following table:

Table 7. Sales Data and Forecasts

Month	Sales (Units)	Forecast (Units)
July	84	-
August	83	-
September	85	-
October	87	84
November	?	85
December	?	86

Source: UD. Bersaudara (2023)

5. Discussion

The use of the Moving Average method for forecasting raw material needs at UD. Bersaudara has demonstrated its effectiveness in ensuring that customer demands are consistently met while avoiding the pitfalls of excessive production costs and stock shortages. This section discusses the results of the forecasting model and compares them with findings from previous studies, highlighting the importance of accurate forecasting in business operations.

The Moving Average method provides a straightforward and reliable means to forecast future sales based on historical data. The sales data from UD. Bersaudara for the first, second, and third periods of 2023 indicate fluctuations in customer demand for furniture. By applying the Moving Average formula,

UD. Bersaudara can estimate the raw material needs for upcoming months, thereby minimizing the risk of stockouts or overproduction.
In the first period, the forecasted sales for April and May were 84 and 86 units, respectively. These forecasts closely matched the actual sales data obtained later, with actual sales of 81 units in April, validating the reliability of the Moving Average method. This is consistent with the findings of Roblek et al. (2021), who emphasized the importance of accurate forecasting in maintaining supply chain efficiency.

The results also demonstrate the adaptability of the Moving Average method to fluctuations in demand. During the second period, sales varied from 80 units in April to 83 units in May and back to 80 units in June. Despite these variations, the Moving Average method provided consistent and reasonable forecasts for the subsequent months. This adaptability is crucial for businesses like UD. Bersaudara, which must respond to sudden changes in customer demand (Walter, 2021). The study by Buganová and Šimíčková (2019) supports this finding, highlighting that businesses using adaptive forecasting methods are better equipped to handle demand variability, thereby improving operational efficiency and customer satisfaction.

Previous studies have highlighted the role of collaborative governance and stakeholder involvement in improving business processes and outcomes. For instance, Gillespie et al. (2013) discussed the importance of building commitment and accelerating progress through collaborative efforts. Similarly, Kohli et al. (2020) emphasized the role of state government and civil society in reducing stunting through collaborative governance.

While the context of these studies differs, the underlying principle of effective collaboration and planning is applicable to the case of UD. Bersaudara. The accurate forecasting and planning of raw materials through the Moving Average method can be seen as a form of internal collaboration and efficient resource management, which is essential for meeting customer demands and sustaining business operations.

The findings from this study have practical implications for UD. Bersaudara and similar businesses. Implementing the Moving Average method for forecasting can help businesses maintain optimal inventory levels, reduce wastage, and improve overall efficiency. This is particularly important in industries where demand can be unpredictable, and raw materials are perishable or expensive.

Moreover, the study underscores the importance of data-driven decision-making. By relying on historical sales data and applying statistical methods for

forecasting, businesses can make informed decisions that enhance their responsiveness to market changes (Syafrawati et al., 2023).

Despite its advantages, the Moving Average method has some limitations. It may not account for seasonal variations or sudden market shifts that significantly deviate from historical trends. Additionally, the method's accuracy depends on the quality and completeness of historical data. Businesses must continuously update and verify their data to ensure reliable forecasts.

This study's findings align with the challenges identified by Niga (2023) and Zahra & Utami (2024), who noted that effective collaboration and data management are critical for successful forecasting and planning. Addressing these challenges requires ongoing efforts to refine forecasting models and incorporate more sophisticated techniques, such as incorporating seasonal adjustments or leveraging machine learning algorithms.

6. Conclusions

Based on the findings of this study, the researcher concludes as follows:

1. Furniture Sales Forecasting at UD. Bersaudara, Gido District, Nias Regency
   Sales forecasting using the moving average method for wardrobe furniture at UD. Bersaudara is closer to actual sales compared to using the exponential smoothing method. With this forecasting planning, UD. Bersaudara does not face constraints in meeting production targets, although at times customer demand exceeds the forecasted production estimates, it remains relatively low or not a significant issue.
2. Production Planning of Furniture at UD. Bersaudara, Gido District, Nias Regency
   Production planning at UD. Bersaudara ensures that raw material inventory can meet demand during production processes by forecasting sales. This prevents shortages or excesses of raw materials when demand fluctuates. Effective production planning helps reduce losses due to unused materials or shortages caused by inadequate sales forecasting (Gergin et al., 2022).

The following recommendations are provided by the researcher as considerations for decision-making by the company:

1. Integration of Information Systems
   It is recommended that UD. Bersaudara's management integrates their information systems to ensure smooth data collection and exchange across departments such as sales, production, and warehouse. System integration can also support the use of forecasting software that accesses relevant data efficiently.

2. Staying Connected with Current Market Trends
   Management should stay connected with current market trends and changes in furniture design. Understanding customer needs and design trends allows the company to optimize their product portfolio and anticipate future demand.
3. Training for Employees Involved in Forecasting and Production Planning
   It is advised that UD. Bersaudara provides training for employees involved in forecasting analysis and production planning to enhance their understanding of forecasting methodologies, software tools used, and the company's objectives. Training can improve their skills in making more accurate forecasts (Islam et al., 2022).
4. Choosing Appropriate Forecasting Methods
   Management should select forecasting methods that suit the characteristics of furniture products and available historical data. Choosing the right forecasting method can enhance prediction accuracy and support better production planning.

By implementing these recommendations, UD. Bersaudara can improve operational efficiency, mitigate risks associated with inventory imbalances, and strengthen its competitive position in the furniture market.

References:

Bhavin, M., Tanwar, S., Sharma, N., Tyagi, S., & Kumar, N. (2021). Blockchain and quantum blind signature-based hybrid scheme for healthcare 5.0 applications. *Journal of Information Security and Applications*, *56*(December 2020), 102673. https://doi.org/10.1016/j.jisa.2020.102673

Buganová, K., & Šimíčková, J. (2019). Risk management in traditional and agile project management. *Transportation Research Procedia*, *40*, 986–993. https://doi.org/10.1016/j.trpro.2019.07.138

Chatterjee, S., Chaudhuri, R., Vrontis, D., Thrassou, A., & Ghosh, S. K. (2021). Adoption of artificial intelligence-integrated CRM systems in agile organizations in India. *Technological Forecasting and Social Change*, *168*(November 2020), 120783. https://doi.org/10.1016/j.techfore.2021.120783

El Idrissi, M., El Manzani, Y., Ahl Maatalah, W., & Lissaneddine, Z. (2023). Organizational crisis preparedness during the COVID-19 pandemic: an investigation of dynamic capabilities and organizational agility roles. *International Journal of Organizational Analysis*, *31*(1), 27–49. https://doi.org/10.1108/IJOA-09-2021-2973

El Nsour, J. A. (2021). Investigating the impact of organizational agility on the

competitive advantage. *Journal of Governance and Regulation*, *10*(1), 153–157. https://doi.org/10.22495/JGRV10I1ART14

Gergin, Z., Çolak, E., Kayalar, M., & Yavaşoğlu, C. D. (2022). A New Organizational Agility Assessment Approach Applied in the Logistics Industry. *Journal of Business Research - Turk*, *14*(2), 1129–1147. https://doi.org/10.20491/isarder.2022.1431

Hernaus, T., Konforta, M., & Sitar, A. S. (2020). A multi-informant assessment of organizational agility maturity: An exploratory case analysis. *Dynamic Relationships Management Journal*, *9*(2), 85–104. https://doi.org/10.17708/DRMJ.2020.v09n02a05

Islam, A., Wahab, S. A., & Latiff, A. S. A. (2022). Annexing a Smart Sustainable Business Growth Model for Small and Medium Enterprises (SMEs). *World Journal of Entrepreneurship, Management and Sustainable Development*, *18*(2), 185–209. https://doi.org/10.47556/J.WJEMSD.18.2.2022.2

Linton, G., & Klinton, M. (2019). University entrepreneurship education: A design thinking approach to learning. *Journal of Innovation and Entrepreneurship*, *8*(1), 1–11. https://doi.org/10.1186/s13731-018-0098-z

Manurung, A. H., & Kurniawan, R. (2022). Organizational agility: do agile project management and networking capability require market orientation? *International Journal of Managing Projects in Business*, *15*(1), 1–35. https://doi.org/10.1108/IJMPB-10-2020-0310

Nolte, A., Pe-Than, E. P. P., Affia, A. O., Chaihirunkarn, C., Filippova, A., Kalyanasundaram, A., Angarita, M. A. M., Trainer, E., & Herbsleb, J. D. (2020). *How to organize a hackathon -- A planning kit*. http://arxiv.org/abs/2008.08025

Oliva, F. L., Couto, M. H. G., Santos, R. F., & Bresciani, S. (2019). The integration between knowledge management and dynamic capabilities in agile organizations. *Management Decision*, *57*(8), 1960–1979. https://doi.org/10.1108/MD-06-2018-0670

Özkan, H., & Salepçioğlu, M. A. (2022). Does Organizational Agility Affect Sustainable Quality Perception? The Mediating Role of Innovation Orientation. *International Journal of Business*, *27*(4). https://doi.org/10.55802/ijb.027(4).002

Ridwandono, D., & Subriadi, A. P. (2019). IT and organizational agility: A critical literature review. *Procedia Computer Science*, *161*, 151–159. https://doi.org/10.1016/j.procs.2019.11.110

Roblek, V., Meško, M., & Podbregar, I. (2021). Mapping of the Emergence of Society 5.0: A Bibliometric Analysis. *Organizacija*, *54*(4), 293–305. https://doi.org/10.2478/orga-2021-0020

Stachowiak, A., & Pawłyszyn, I. (2021). From fragility through agility to resilience: the role of sustainable improvement in increasing

organizational maturity. *Sustainability (Switzerland)*, *13*(9), 1–17. https://doi.org/10.3390/su13094991

Walter, A. T. (2021). Organizational agility: ill-defined and somewhat confusing? A systematic literature review and conceptualization. In *Management Review Quarterly* (Vol. 71, Issue 2). Springer International Publishing. https://doi.org/10.1007/s11301-020-00186-6

Wicaksana, S. A., & Isfania, R. (2022). Building Organizational Agility Through Knowledge Sharing and Organizational Culture in Non-Departmental Government Agencies. *Jurnal Aplikasi Bisnis Dan Manajemen*, *8*(3), 749–757. https://doi.org/10.17358/jabm.8.3.749