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Article

Artificial Intelligence-Based Decision Support Systems for Business Process Optimization: A Data-Driven Framework for Enhancing Organizational Efficiency and Strategic Decision-Making

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Abstract: Artificial Intelligence decision support system is playing a vital role in business process optimization and increasing the efficiency of the organization by making the decision based on data. The goal of this research is to uncover patterns and relationships between operational data, and to discover performance indicators for business processes, to enable strategic managerial decisions. The research goals are to explore operational cost distributions, to assess utilization of the workforce, to analyze relationships between important business performance measures and to build an operational efficiency framework to support strategic decision making. This study employed a quantitative exploratory research design; a secondary data obtained from Mendeley Data published in 2023. The dataset was cleaned, streamlined and analyzed using exploratory data analysis, descriptive statistical analysis, correlation analysis and visualization tools such as box plots, scatter plots, correlation heatmaps and an operational efficiency dashboard, within R Studio. The results show across a wide range of costs for operating the business, mainly in terms of costs on skill investment and overtime costs but also on digitization costs. Correlation analysis reveals the significant relationships between workforce allocation and operational costs, as well as between operational costs and business performance measures, while resource utilization shows a positive correlation with operational workload. The operational dashboard also shows the following key performance indicators: workload, objective value and unserved task costs. Overall, it is shown that data driven exploratory analysis is successful in supporting the work of an artificial intelligence-based decision support system, especially in the aspects of resource allocation, business process optimization and strengthening the organizational decisions making process.

Keywords: Artificial Intelligence, Decision Support, Business, Optimization, Data, Strategic



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1. Introduction

A. Background of the Study

Artificial intelligence is a technology that has the potential to transform how businesses run and operate, and is helping companies to make informed decisions, optimize their resources and improve the efficiency of their business processes. Today, organizations collect vast amounts of operational data from enterprise systems, which enable them to gain valuable insights that can be put into action to boost productivity and organizational performance. Decision Support Systems using Artificial Intelligence have the potential to incorporate sophisticated analytical capabilities, machine learning, and data driven methods, to analyze complex business situations, detect operational inefficiencies and provide real-time recommendations for informed decision making [1]. These systems can help to automate processes, enhance predictive accuracy, optimize resource usage, and ensure that the organization remains agile and responsive to market shifts. Organizations are becoming more aware of the need for intelligent decision support as digital transformation is gaining momentum in every industry in order to improve service quality, stay competitive and to strive for sustainable operational excellence [1]. In addition, AI enabled decision support systems encourage evidence based managerial decisions by transforming operational data into useful, longer-term knowledge, which helps to guide managerial decision making. Thus, the combination of AI and BPO has become a pivotal strategy for optimizing business processes, making them more resilient and improving strategic decision making in data-rich environments.

B. Problem Statement

Although AI technologies have seen considerable progress, a growing number of organizations still face difficulties in optimizing business processes and making timely strategic decisions, as a result of the lack of a unified view of organization's operational data, inefficient use of resources and the use of traditional approaches to decision making [2]. Current decision support systems are not well developed to offer sufficient automation and analytical tools to detect inefficiencies in the process and suggest the best operating strategy. In addition, organizations often have difficulty in converting the complex business data into knowledge which feeds forward for continuous process improvement and organizational efficiency. These constraints hinder business productivity, cost, and management responsiveness to changing business dynamics. Accordingly, a data-driven framework that systematically investigates operational variables and facilitates decision support systems based on artificial intelligence for optimizing business processes, improving organizational efficiency and evidence-based decision making is increasingly needed [2].

C. Aim of the Research Paper

The objective of this research is to find patterns, relationships and optimization opportunities in operational business data to support decision support systems that can be used to optimize business processes, increase organizational efficiency and enable effective decision making for strategic business decisions using artificial intelligence.

D. Research Objectives

The following objectives have been accomplished from the completion of this research work efficiently:

- To gain understanding of how business processes work and what factors affect their

performance to enable business process optimization.

- To explore data relationships in resource usage, cost and service delivery using exploratory data analysis.
- To uncover business and patterns which help improve organizational efficiency.
- To suggest a data-driven framework for supporting decision support systems for strategic managerial decision making on the basis of artificial intelligence.

E. Significance of the Study

The study adds to the body of knowledge for decision support systems using artificial intelligence by performing a detailed exploratory analysis of operational data from the business to identify meaningful patterns that affect the performance of the organization. The results will help managers to understand how resource use, operational costs, service performance and efficiency of business processes are related, and will support informed decisions on strategy. The proposed data driven framework is designed to provide an opportunity for identifying inefficiencies and opportunities for process improvement in the operations without the use of predictive models alone, but still provides support for intelligent decision making that can be achieved with exploratory analytics. Academically, the research contributes to the knowledge of the use of exploratory data analysis in combination with business process optimization and decision support systems. Industrially, the study provides practical tools and suggestions for organizations looking to enhance their overall operational efficiency by employing AI and data analytics to make informed decisions and avoid unnecessary expenses while maximizing value.

2. Literature Review

A. Artificial Intelligence in Business Decision Support Systems

Business decision support systems are revolutionized by artificial intelligence, which enables companies to manage vast amounts of data generated by their operations and produce meaningful data for business decisions. Decision support systems are now capable of detecting hidden patterns, making more accurate forecasts and optimizing complex business operations in various functional areas through intelligent algorithms. As discussed in Gupta, et al. [3], the inclusion of artificial intelligence in decision support systems has facilitated optimization, simulation, predictive analysis and intelligent decision making, which has bolstered the strength of operations research. The authors also highlighted the capability of AI methods to streamline business operations, enabling quicker analysis and better recommendations in uncertain business surroundings.

The widespread use of digital technologies has propelled the development of business culture towards smart and data-driven decision making. AI-powered frameworks are becoming a staple in organizations for enhancing strategic planning, operational agility, and organizational agility and responsiveness. As cited by Rajagopal et al. [4] AI can help organizations create a cohesive digital environment that promotes collaboration, knowledge sharing and better managerial decision making. The study established that the intelligent decision support systems enable the agility of the organization, through continuous analysis of business information and managers' decision making on choosing suitable strategies that suit the organizational objectives.

AI has also shown impressive potential in bolstering enterprise management, with its help making more complex economic and operational decisions. Intelligent decision support systems combine analytical models with business information to optimize resource allocation, minimize operational inefficiencies and boost organization productivity. As Zhao said [5], artificial intelligence-based decision support systems are used to analyse the information about economic management and give timely recommendations to large enterprises to improve business performance. The research also showed that by constantly analysing operational data, intelligent systems can help organizations make better decisions, helping them adapt to market changes without compromising their sustainable growth.

With the rise of Big Data, AI has been able to add to its ability to assist and inform organizations

with sophisticated analytics and knowledge discovery. AI technologies enable data from varied sources to be analyzed for meaningful insights that can be used to optimize business processes and enhance strategic planning. AI is a transformative force in today's business landscape, as described by Duan et al. [6], by embedding machine learning, knowledge management, and data analytics into organizational decision-making processes. While AI can be transformative for decision quality, the authors noted that organizations need to also solve issues of data quality, transparency and the effective collaboration between humans and intelligent decision support systems to harness the full potential of AI.

B. Business Process Optimization and Organizational Efficiency

In today's fast-changing business landscape, optimizing business processes has emerged as a crucial strategy for businesses looking to boost operational efficiency and stay competitive. By harnessing the power of AI, businesses can automate repetitive tasks, make efficient use of resources, and make data-driven decisions. According to Wamba Taguimdje et al. [7] transformation projects based on AI created significant value for business through enhanced organizational capabilities, improved process efficiency and better firm performance. The study also highlighted that companies using AI technologies have a better chance to perform operational excellence by performing continuous process improvements and intelligent resource management.

As more and more data is becoming available for businesses, more and more business organizations have started to utilize data analytics tools to help them streamline business processes and enhance their business performance. Business process optimization involves the systematic analysis of business activities to find inefficiencies and improves productivity and reduces delays in the process. Data analytics has been identified as a beneficial tool to leverage evidence-based decision making and enhance the performance of business operations in SMEs, according to Ogeawuchi et al. [8]. The review was carried out and it was found that analytical techniques help organizations to detect process bottlenecks and help them in implementing effective processes optimization strategies which help them to achieve long term sustainability and growth in the business.

Digital technologies also have ushered a new era in organization operations by effectively automating their everyday operations with intelligent technology. Robotic Process Automation has emerged as a big hit in the field of enhancing the process efficiency by eliminating manual effort and increasing process accuracy in administrative and financial processes. As explained by Kokina and Blanchette [9], digital labour with the help of RPA can help businesses automate repetitive accounting tasks, boost operational consistency and streamline workloads. The study also found that automation can boost employee productivity because they can focus on more strategic and analytical tasks, instead of mundane operational work.

Knowledge sharing is essential for achieving the full potential of AI's organizational benefits, by enabling collaboration and informed decision making. AI systems provide business insights that are helpful and can be useful when embedded in the organization's knowledge management processes. From the perspective of Olan et al. [10] artificial intelligence can support the organizational performance by encouraging the sharing of knowledge by employees and helping the utilization of organizational knowledge when making decisions. The results indicated that companies with effective collaboration between AI technologies and knowledge sharing practices exhibit significantly higher operational competencies and business performance.

The literature taken together suggests that AI is a key enabler of business process optimization, data-driven process improvement and collaborative knowledge management, which collectively has established it as a critical enabler for organizational efficiency and business process optimization. The studies reviewed consistently show that businesses can enhance operational productivity, optimize resource usage, and boost their overall performance by effectively applying AI with BPM. They give a good theoretical basis for exploring the potential of using data driven analytical methods to improve organizational efficiency further, and to aid in intelligent business decision making.

C. AI-Driven Business Analytics for Strategic Decision-Making

Business Analytics powered by Artificial Intelligence (AI) has become a strategic capability that can help companies harness vast amounts of business data to provide useful insights and making decisions. Artificial intelligence has been combined with machine learning and deep learning technologies, enhancing organizations' analytical capacities, and delivering more accurate forecasts, along with the ability to uncover new business trends and patterns and assist strategic planning. As stated by Manduva [11] AI technologies open new possibilities for innovative business strategies, leading to an increased analytical intelligence and allowing organizations to respond to the ever-changing market conditions. The study also revealed that intelligent analytical systems enhance the adaptability of an organization by supplying timely and reliable information in the managerial decision-making process.

In today's digital age, companies like retail giants, fintechs, service providers, and many others are turning to AI-driven analytics to drive better business performance and ensure robust strategic decision-making. Advanced analytical techniques help decision makers analyze business performance, allocate resources efficiently and find opportunities for continuous improvement. As per Selvarajan [12] artificial intelligence enhanced analytics offers industry specific solutions, where a normal decision-making process is thus turned into a data driven process that can aid in increasing the operational efficiency and the competitiveness of every organization. The study highlighted the importance of intelligent analytics to make evidence-based decisions by evaluating business information and indicators comprehensively.

In the business world, AI-powered business intelligence frameworks have revolutionized customer-oriented decision making, allowing businesses to gain insights into customer behavior and provide tailored experiences. Analytical models act on customer data to uncover preferences, behavior, and market trends to inform effective strategic business planning and growth. Olayinka [13] says that data driven customer segmentation can help in making better decisions for customer segmentation to create personalized strategies that will improve customer engagement and organizational performance. The results showed that the combination of AI and business intelligence (BI) frameworks enhances the organization's capabilities, enabling personalized decision making and boosting long-term customer value.

Multiple decision-making strategies are also integrated to make AI-driven analytics a valuable tool in improving operational performance. Complex operational data are analyzed by intelligent systems and the optimal actions which increase the productivity and efficiency of the organizations are recommended. From the perspective of Al Surmi et al. [14], the use of artificial intelligence in decision-making is a blend of analytical approaches that enhances operational efficiency by enabling better resource utilization and decision-making. The authors finally drew the conclusion that the organizations that use AI-based business analytics are more successful in their strategic efforts due to continuous monitoring of operational data and information and evidence-informed decision making, thus emphasizing the significance of intelligent analytics in today's organizational settings.
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D. Empirical Studies on AI-Based Decision Support Systems and Business Process Optimization

Empirical studies have shown that AI is an influential technology that can enhance operational performance and optimize business processes in various organizational contexts. The experience in applying AI in the context of operations management and supply chain work has been captured in case-based research, which has yielded valuable evidence. Helo and Hao [15] explain that AI can improve operational decision making by making better forecasts, creating optimal production planning and making supply chain more responsive. The study also revealed that organizations implementing AI technologies saw improvements in utilizing business data and intelligent analytical tools to enhance operational efficiency, leading to improvements in process optimization and organizational performance.

In this scenario, the use of Artificial Intelligence models for decision making has grown in manufacturing industries, to help decision making related to organizational development in the framework of Industry 4.0. The presented empirical studies have been particularly interesting in analyzing and identifying the role of intelligent analytical systems for business condition assessment and selection of appropriate operational strategies. According to Patalas Maliszewska et al. [16] artificial intelligence-based decision-making models help manufacturing companies to enhance the efficiency of their production processes and to support strategic business development by intelligent evaluation of the information provided by the production process. The results revealed that the application of AI in manufacturing processes contributes to the organization's competitiveness by supporting the making of accurate and timely manufacturing decisions.

Empirical evidence in recent times has also highlighted the synergy between AI and human skills in decision-making processes. AI is not intended to replace human judgment; rather, it is designed to be a smart tool that enhances analytical skills and decision-making. Human-AI collaboration in Xu et al. [17] focuses on how human intelligence can complement AI to improve operational decision making, particularly when faced with complex organizational challenges. The study found the collaborative decision-making frameworks have a positive impact on business process optimization, which helps managers make informed decisions and adapts the organization to volatile business environments.

E. Literature Gap

The reviewed studies primarily emphasize artificial intelligence implementation, business analytics, and operational optimization while providing limited attention to exploratory analysis of operational datasets for supporting business process optimization. Moreover, insufficient research has proposed a comprehensive data driven framework that integrates organizational efficiency with artificial intelligence-based decision support systems to strengthen strategic decision making.

3. Methodology

A. Research Design

The study uses an exploratory research design with a quantitative approach in order to study the operational factors that affect the business process optimization and organizational efficiency. The exploratory approach is suitable when a predictive model is not required; it allows for a systematic investigation of operational data to uncover patterns, relationships and trends that might exist. A data driven approach to assessing the relationships between resource use, operational cost, service performance and business process measures. The whole analytical method adopted is Exploratory Data Analysis which presents descriptive and visual information on the data. The results obtained from this research design help to gain the understanding how an operational information can be used to strengthen the strategic managerial decision making and organization's performance using decision making support systems of artificial intelligence.

B. Data Source and Description

The data used in the study is a secondary data sourced from Mendeley Data in 2023. The dataset is comprised of several worksheets, each with operational data for technician routing and scheduling, resource allocation, service performance and organizational cost management. All of the worksheets contain a variety of experimental setups and optimization parameters, and together offer an in-depth look at all the operational activities. The data set contains variables like number of technicians, number of tasks, total work time, task duration, average path length, served customers, unserved customers, overtime cost, Digitization cost, Skill investment cost, solution value, objective value [18]. These variables offer a suitable basis for studying business process optimization and operational efficiency. The data is saved in Mircrosoft Excel file format and is imported into the R-Studio for preprocessing, integration, statistical analysis and visualization.

C. Data Preparation and Integration

Collected data is processed and prepared according to a certain structure prior to analysis to

guarantee the consistency and analytical reliability. Data is imported into R Studio, using the appropriate data import packages, and explored on an individual worksheet to check for relevant variables for the study. Where appropriate, variables relating to operational performance, resource utilization, service delivery and cost management are chosen and combined into a single analytical data set. Data quality is determined by completeness of observations, presence of duplicate records, consistency of variable names, and possible outliers. Numerical variables are transformed to appropriate formats to perform statistical computations and visualization. The systematic preparation process not only helps to improve the consistency of data but also lays a sound basis for performing thorough exploratory analysis.

D. Exploratory Data Analysis

Exploratory Data Analysis is used to analyze the nature and patterns of variables used in operations in the data set. This analytical approach helps identify potential hidden trends, distributions of variables, bottlenecks in operations and relationships between important business performance indicators. The analysis highlights the evaluation of workforce utilization, operational costs, customer service performance and optimization measures by descriptive exploration and graphical interpretation. Correlation analysis is also carried out to explore the relationships between operational variables which can affect the efficiency of the organizations. The analysis gained from the exploratory analysis gives valuable information on operational behaviour and opportunities for business process optimization by the support system based on artificial intelligence.

E. Statistical Analysis

Descriptive statistical techniques are used to describe the general features of the operational data sets and to aid interpretation of business performance indicators. Calculations such as mean value, median value, minimum value, maximum value, standard deviation and variance are used for assessing the central tendency and variability of numerical variables. The relationships among selected operational variables are evaluated by correlation analysis to look for significant associations, which could affect the efficiency of the organizations. These statistical measures can be used as quantitative evidence in interpreting the operational behaviour and are used to identify the important factors for business process optimization.

F. Visualization Techniques

Data visualization techniques are used to effectively communicate analytical results and help managers interpret operational performance. An appropriate graphical library is used to realize the visual analysis in R studio and produce informative charts of the distribution of cost, use of resources, operational relationships and business performance indicators. Analytical results are presented using box plots, scatter plots, correlation heatmap and an operational performance dashboard. The ability of these visualizations to distill complex operational data, uncover relationships between variables and data that are invisible, and to help focus attention on areas that need improvement in the organization is what sets them apart.

G. Ethical Considerations

The study follows the guidelines of the ethical principles throughout the procedure of research. Data used in this study comes from a secondary data repository that is open to the public and therefore no personally identifiable or confidential information is presented. Only academic research is performed with the dataset, and is done as per the guidelines of usage of the repository. The analysis is carried out objectively, without the manipulation and falsification of the collected data. Literature cited and secondary sources used are properly cited and referenced, showing academic integrity and transparency.

H. Limitations

There are a number of limitations for this study. The analysis is based on a secondary dataset that reflects certain operational situations and does not necessarily exhaustively reflect the diversity of business processes in various industries. Exploratory is a type of research that shows patterns and

relationship but not cause and/or prediction. In addition, the results are limited to the variables included in the data set and thus cannot be viewed as a representation of all aspects of organizational decision making. Even with these shortcomings, the study offers useful insights into business process optimization, and serves as a solid basis for further research with predictive analytics and artificial intelligence supported decision support systems.

4. Conceptual Framework

The conceptual framework of this study shows the relationships between operational inputs, business process variables, artificial intelligence-based decision support systems and organizational outcomes. The inputs resulting from this dataset are related to several workforce utilization indicators, task characteristics, operational costs, investments in digitization, investments in skills, and efficiency indicators for the process. The operational factors are explored using Exploratory Data Analysis, statistical analysis, correlation analysis and visualization methods to provide meaningful business insights. AI based decision support system is the analytical tool that converts the operational data into productive information for the managers. The outputs are better resource utilization, less inefficiency in business processes, better cost control, improved business process performance, and better-informed strategic decision making. Overall, the framework illustrates the role of data driven intelligence in improving overall organizational efficiency, operational excellence and sustainable business performance.

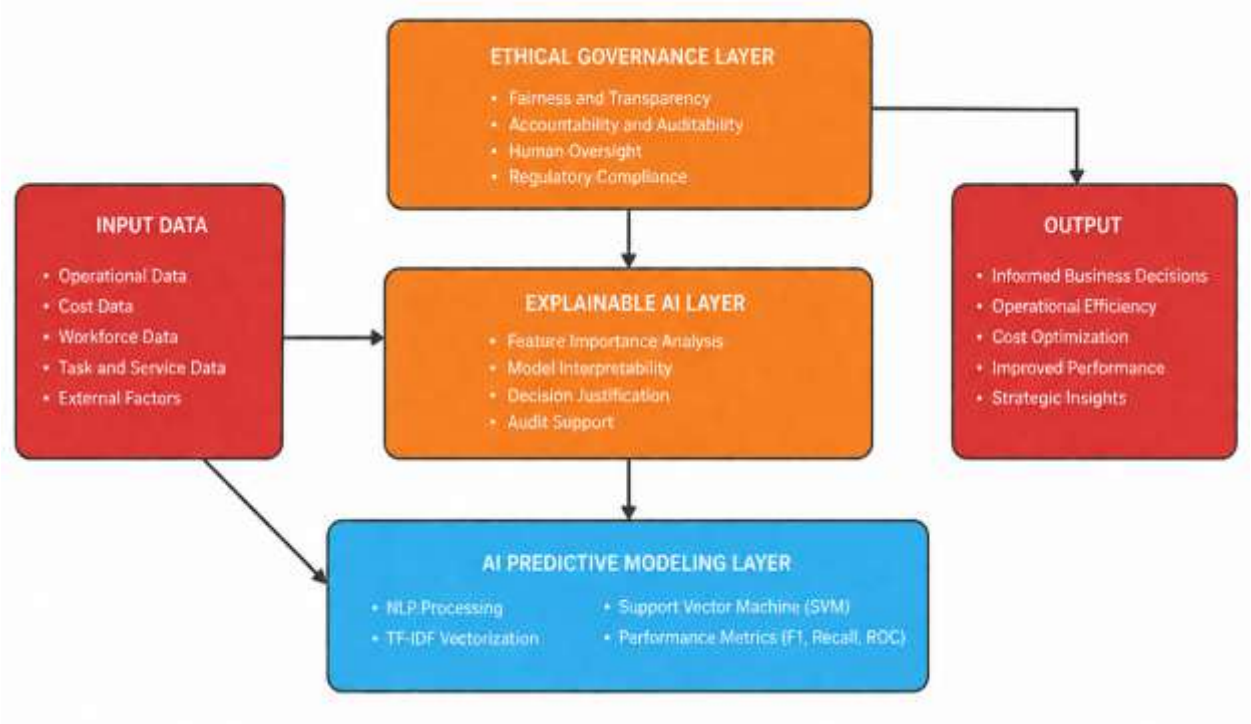


Figure 1. Conceptual Framework Diagram

(Source: Created by learner)

5. Results

A. Distribution of Operational Costs Across Decision Scenarios

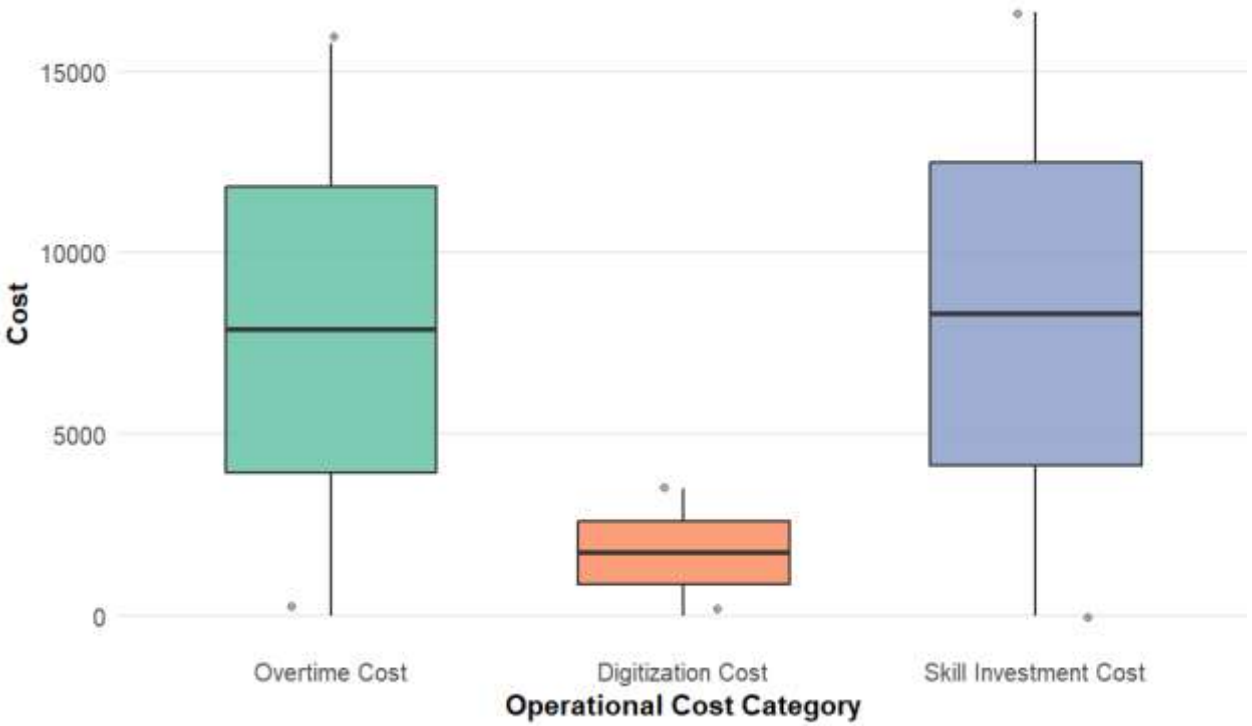


Figure 2. Comparative Analysis of Major Operational Cost Components

(Source: Created by learner)

The box plot shows that there is significant difference in the components of operational cost for various decision scenarios. The median and distribution of skill investment cost is the highest, suggesting that this area of spending is large and consists of a wide range of expenditure. Overtime cost also exhibits a high level of dispersion, including a number of extreme values, indicating an inconsistent workload distribution across the scenarios. By comparison however, the cost of digitization is comparatively lower and stable, suggesting less financial investment in technology-related investments, but opportunities for cost effective business process optimization.

B. Resource Utilization and Service Performance Analysis

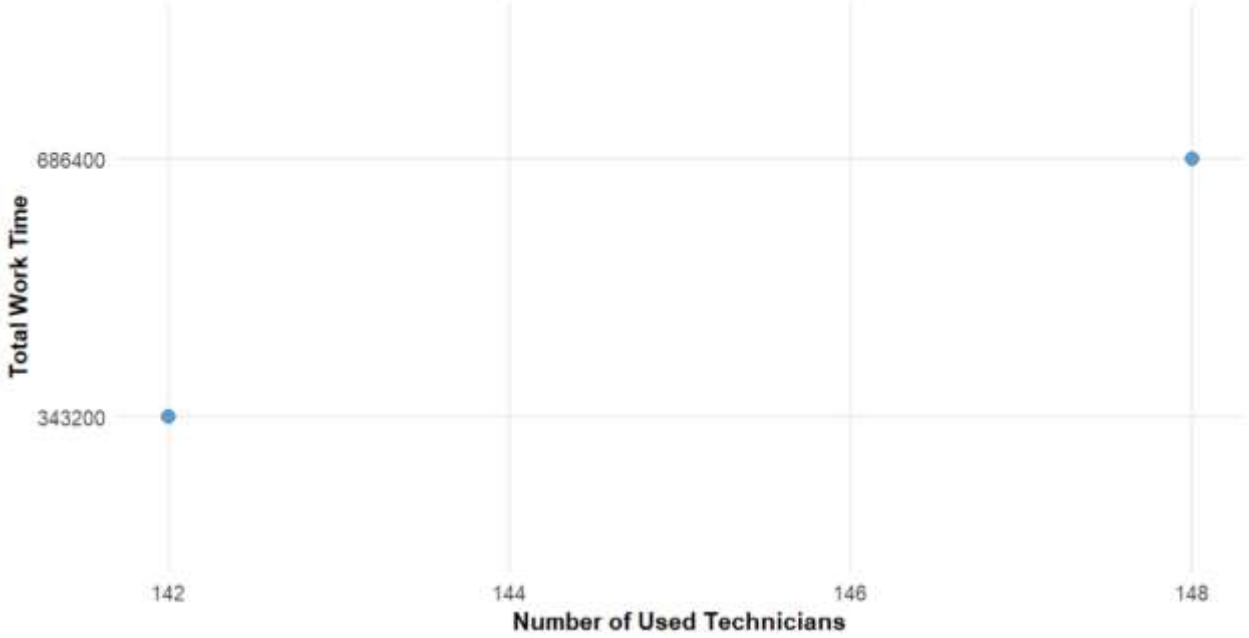


Figure 3. Relationship between Used Technician and Total Work Time

(Source: Created by learner)

The scatter graph shows a positive correlation between the number of technicians that are used and the total time worked. An expansion of the workforce from 142 to 148 technicians will increase the total number of work time units from about 343200 to 686400. The pattern indicates that the more people who are in the workforce, the more work is done. The results emphasize the need for improved allocation of technicians for efficient operation without overusing the resources.

C. Correlation Analysis of Business Process Performance Indicators

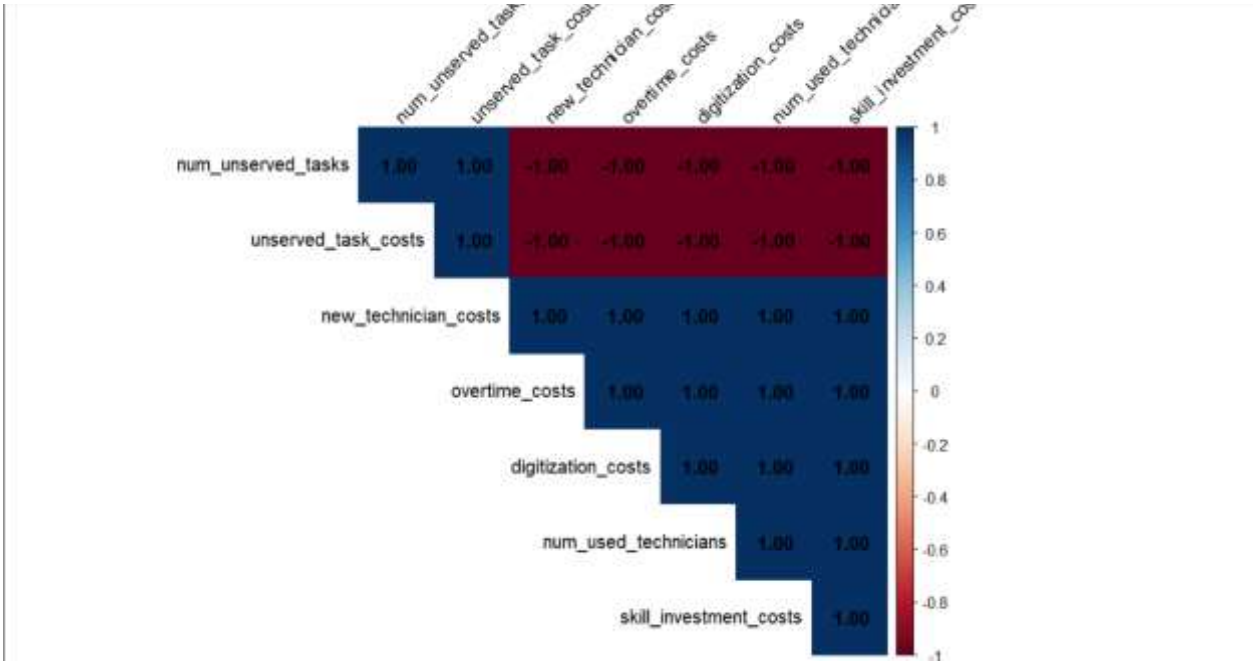


Figure 4. Correlation Among the Performance Indicators

(Source: Created by learner)

The correlation heatmap shows that selected operational variables have strong relationships among them in influencing the business process performance. The cost related variables, such as

overtime cost, digitisation cost, skill investment cost and new technician cost, show perfect positive correlation, meaning that the costs of these are all increasing at the same time in the different operational scenarios. On the other hand, values of unserved tasks and unserved task costs have significant negative correlation with the workforce investment variables indicating that the better invested workforce reduces operational inefficiencies. These findings highlight key performance drivers that contribute to effective organizational decision making.

D. Operational Efficiency Dashboard for Strategic Decision Support

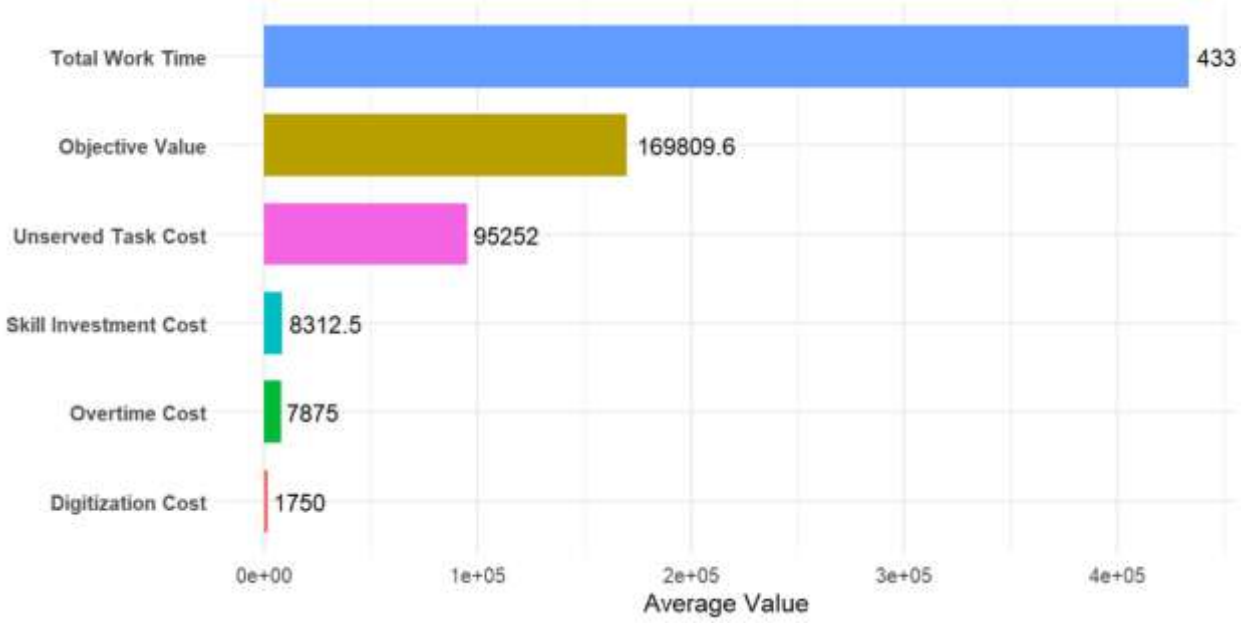


Figure 5. Key Performance Indicator for Strategic Decision Support

(Source: Created by learner)

Operational efficiency dashboard gives a summary of important organization performance metrics for strategic business decisions. The results showed that operational workload (total work/time) had the highest mean value followed by objective value and unserved task cost signifying that the work of the operational and task that has not been resolved has the highest influence on the performance of an organization. In contrast, the cost of overtime, skill investment and digitization are much lower, indicating a sound balance between work and technology investment. These understanding can help in making informed managerial choices to boost operational effectiveness and streamline business processes.

6. Discussion of Results/Findings

The results show that the operational cost components are different for different decision scenarios and thus play an important role in the optimization of the business processes. Skill investment cost or overtime cost is more variable than the digitization cost, suggesting that investment in skills and extra labor are the main financial concerns in operational management. Investments in technology-related items appear to have a relatively stable trend in digitization costs, which can be interpreted as technology being more predictable and potentially offering long-term benefits to the operation without significant variations in costs. The observations suggest that organizations need to consider carefully how the workforce investments and technology use are balanced to enable sustainable operational efficiency.

The resource utilization analysis shows that the number of technicians used is positively correlated with the total amount of time worked, suggesting that the more technicians that are working, the more total time is being spent in operation. As this relationship indicates, organizations have to have effective workforce planning to make sure that new employees are adding to the service provision, and not to the non-sensical cost of the organization. Moreover, high correlations are found

between a number of operational variables, such as workforce investment, overtime costs, digitization costs. The inverse pattern between unserved tasks and the resource related variables suggest that strategic deployment of organizational resources would be able to cut down on service gaps and enhance the performance of the operations.

The operational efficiency dashboard consolidates various key performance indicators into one view, giving an overall view of organizational efficiency. The service demands have not been fully addressed so far, as can be seen from the relatively high values of total work time, objective value and unserved task cost, which make operational workload and unresolved service demands still a problem in business process optimization. Conversely, relatively smaller investments in digitization and overtime indicate potential to optimize organizational performance by smart utilization of technology and human resources. In general, the results showed that data analysis with exploratory approach can provide management information that can be used to detect inefficiencies in the operations, optimizing resource use and contributing to the use of artificial intelligence in decision support system for improving strategic decision making and organizational efficiency.

7. VII. Future Work

The present study can be extended by future research using the advanced A.I. techniques that advance beyond exploratory analysis to predictive and prescriptive decision support. Random Forest, Gradient Boosting, Support Vector Machines, and Extreme Gradient Boosting are examples of machine learning algorithms that can be used to predict operational cost, workforce needs and optimization results based on different business scenarios. Predictive Analytics combined with real time organizational data would allow decision makers to predict operational disruptions and take proactive action to enhance business process efficiency. Further research could also explore the impact of EAI techniques on improving transparency and trust in automated decision-making systems.

Larger and more diverse datasets across multiple industries should be used in future studies, to enhance the generalizability of research findings. By combining cloud computing, Internet of Things technologies, and enterprise resource-planning systems, continuous streams of information about operations can be transmitted for dynamic decision making. Comparative analysis of each of the industries (manufacturing, healthcare, logistics, retail, financial) would enable industry-specific optimization frameworks that could appropriately deal with specific challenges in operation. Furthermore, future research could explore sustainability-related indicators, productivity of employees, customer satisfaction, and environmental performance, and create a comprehensive decision support system based on artificial intelligence which improves organizational efficiency, organizational strategic competitiveness, and long-term business resilience.

8. Recommendation

To foster wider integration of AI-based decision support systems, organizations should centralize analytical platforms that incorporate operational data, workforce and cost management indicators. There is a need to pay more attention to smart allocation of the workforce, reduce overtime bill, and enhance skills development through intelligent resource planning. Stable digitization cost suggests that investment on digital technologies should continue, as there is potential for long term operational improvement without excessive investment. Organizations are also asked to conduct ongoing performance monitoring through the use of interactive dashboards and analytical visualizations to aid in evidence-based managerial decision making. Regular analysis of KPIs can help to early identify inefficiencies in the operation and optimize the use of resources. Moreover, incorporating predictive analysis into current decision-making processes can improve strategic planning, operational agility, and organizational effectiveness.

9. Conclusion

The study focused on the role of AI based decision support systems in optimizing business processes using data driven exploratory approach. Contingency costs, staff utilization, business

outcome measures and organizational efficiency were analyzed using descriptive statistics and visual analytical tools. Results showed that there were significant relationships between operational variables, emphasizing the need to allocate resources effectively, manage employees and optimize costs to improve organizational performance. The operational dashboard also showed the importance of combining different performance indicators in order to support managerial strategic decisions. The study validates the fact that exploratory data analysis gives value added lessons learned for detecting operational inefficiencies and identifying opportunities for ongoing business process improvement. Despite being a secondary data study and exploratory research, the study provides good foundations for future implementation of predictive models of artificial intelligence. Overall, the proposed data driven framework helps to improve the organizational efficiency and enables to make informed strategic decisions with intelligent analysis of operational business data.

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