
| RESEARCH ARTICLE

Technological Advancement and its Effect on Business Operations

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| ABSTRACT

Technological advancement is pivotal in transforming business operations, enhancing efficiency, and fostering competitive advantages. The integration of digital technologies reshapes how businesses manage their processes, respond to market demand, and improve customer experience. The sector of business operations is witnessing a tremendous improvement in technology in today's society. Businesses that adapt to the advancement of technology improve business operations and enhance efficiency and productivity. This study examines the technological advancement and its effect on business operations. This is a descriptive quantitative form of research and used survey questionnaires and gathered data through face-to-face collection. The total enumeration was used with six (6) businesses located at Purok-4, Imbatug, Baungon, Bukidnon. Data were analyzed through descriptive and inferential statistics using mean and standard deviation, Pearson R, T-test, and ANOVA. In determining the significance difference, Pearson's R was used, and for the significance relationship, the T-test and ANOVA were used. The findings revealed that the overall mean score for technological advancement among the businesses surveyed was 2.91, indicating a "High Technological Advancement". The overall result mean for business operation was 3.5 as "Very High Technological Advancement". The study found that there were no significant differences in effects on technological advancement to business operations when grouped according to the demographic profile of the business; therefore, the Ho1 was accepted, regardless of factors type of business, the number of years in the business, and average monthly sales. The study also found that there was no significant relationship between technological advancement and business operations, suggesting a very weak or negative correlation of (-0.0151); therefore, the Ho2 was accepted. This indicates an opportunity for further investigation into how businesses can effectively integrate technology to enhance operational outcomes. As business expands, keeping up with technological advancements is crucial to maintaining competitiveness. Utilizing technology enhances services and operations while creating new opportunities for growth and success. It plays a vital role in optimizing processes and ensuring efficient operational management in the digital era. Moreover, integrating technology into business operations is essential for boosting efficiency and productivity. By leveraging technology, businesses can enhance performance and gain a competitive edge in the market.

| KEYWORDS

Business operations, efficiency, and technological advancement.

| ARTICLE INFORMATION

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1. Introduction

Technological advancement is pivotal in transforming business operations, enhancing efficiency, and fostering competitive advantages. The integration of digital technologies reshapes how business manage their processes,

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respond to market demands, and improve customer experience. The sector business operations are witnessing a tremendous improvement in technology in today's society. Technology has an effect on how businesses run and brings about changes. In facilitates easier, quicker, and more efficient business. Technology increases the efficacy of goods and services systems.

In addition, the development of technology is one of the essential components. Nur Romah et al. (2023) suggested that improving business operations and implementing efficient operational management to be competitive in the digital era. Businesses all over the world relies on modern technologies to improve stakeholder engagement. Businesses must continuously adapt the technological changes to meet evolving consumer expectations, maintain a competitive edge, and drive growth in the digital era (Wilson et al., 2024). Technological advancement drives digital transformation of business, leading to process improvements and better products and services (Shaliya 2023).

Further, technology, which revolutionized corporate operations, was now a crucial component of contemporary business operations. It helped companies run more efficiently and enhanced their operations. In order to stay competitive and expand, the organizations embraced technology as it continued to change and capitalized on its advantages. Its activities were now nimbler and more adaptable. One of the most significant effects of technology advancements in the Philippine industry was rising of e-commerce. Technology enabled small businesses owners to set up operations utilizing the most efficient technology available, new discoveries result in the creation of cutting-edge devices like computers and cellphones that promotes contact and communication (Astherchan & Rosenberg, 2015). Businesses now have additional avenues to expand their operations and connect with customers.

In connection, the rapidly emerging age of rapid technological advancement and changing conditions in the market, the incorporation of digital transformation is becoming a crucial factor in determining the business survival and prosperity. Give them the tools to take advantage of the potential of digital transformation. However, negotiating the route to prosperous digital transformation was a complex puzzle that requires a thorough comprehension and a calculated strategy (Pascual et al., 2023).

Furthermore, servers and mobile devices were only a few of the technologies used by small firms to get a competitive edge in their operations. For more efficient integration, the wholesale sector would incorporate technology into their planning process. The researchers chosen the topic of technological advancement and its effect on business operation with aimed of ensuring that the responses from the participants in our research greatly contributed to the findings of the study. The researchers were interested in determining the potential effect of technology on businesses and exploring the benefits of technological advancements for emerging businesses, and aimed to identify the challenges in integrating technology into business.

1.1 Research Questions:

This study seeks to answer the following core question: *How do technological advancement effect business operations in Barangay Imbatug in the Municipality of Baungon?* The supporting questions examine the relationship between technological advancement and business operations.

1.2 Purpose of the Study:

The main objective is to assess the extent how technological advancement effects on business operations. Thus, the output of the study will be the basis in order to improve operations, enhance efficiency, and increase productivity. The findings of this research intended to provide insights and recommendations that will help small business effectively utilize technology to gain a competitive advantage and improve operational performance.

1.3 Significance:

The results of the study will beneficial to the customers, future researchers, owners, and researchers. Customers benefit from technological advancements in businesses as they gain seamless, convenient, and personalized access to products and services. Owners as it provides valuable insights into how technological advancements can improve overall business operations. Moreover, future researchers can build upon these findings to explore emerging trends

and innovations that further enhance business efficiency and customer satisfaction. It also serves as a foundation for academic inquiry, encouraging deeper investigation into the evolving relationship between technology and business operation. Additionally, the study contributes to the broader body of knowledge in the field, fostering collaboration and informed decision-making among stakeholders.

2. Methods

2.1 Research Design

The study employed a descriptive quantitative analysis, which is appropriate for studies aiming to provide a clear and objective picture of a particular phenomenon. In this approach, numerical data were collected, organized, and analyzed to characterize and summarize the properties of the dataset by providing metrics such as frequencies, percentages, means, medians, and standard deviations. These metrics were applied to present the data in a systematic manner and effectively illustrate patterns and trends that can be easily identified within the dataset for the purpose of a descriptive study. By using this technique, researchers can arrange and clearly display the data, which facilitates a simpler interpretation of the findings. However, descriptive statistics only describe the data as it is; they cannot be used to draw conclusions about certain causality or correlations between variables (Loeb et al., 2017).

2.2 Participants and Sampling Method

The respondents of this study were the six (6) business owners in the Purok 4, Imbatug, Baungon, Bukidnon. This study utilized total enumeration.

Inclusion criteria included:

- (1) Business owners operating within Purok 4, Imbatug
- (2) Business categorized under merchandising and wholesale
- (3) At least two years in operation and reported average monthly sales of ₱20,000.00 or above.

2.3 Research Instrument

Data were gathered using a **structured questionnaire** with three main sections:

- **Part I:** contained items pertaining to the demographic profile of the business as types of business, number of years in the business, and average monthly sales.
- **Part II:** covered questions relating to the technological advancement in terms of digitalization, cloud computing, and e-commerce
- **Part III:** contained items pertaining to the business operations relating to the operational efficiency, enhance customer service, and automation of calculations,

The questionnaire on the assessment of technological advancement and its effect on business operations was adapted from a previous study by Richmond & Houston (2024), which was modified to suit the variables of the present study. The researcher sought the permission of the aforementioned rightful owners of the instrument to give proper credit to their work. The adaptation ensured that the questionnaire remained relevant and aligned with the specific objectives and context of the current research.

2.4 Data Gathering Procedure

The researchers first sought formal approval from the Campus Head to conduct a comprehensive survey outside the university premises, ensuring that the study followed institutional guidelines. Permission was then obtained from the barangay captain of Imbatug to secure local support and cooperation during the data-gathering process. In addition, the researchers personally approached business owners to request their participation and scheduled the survey administration at times most convenient for them to avoid disruption of daily operations. A structured questionnaire was employed as the primary research instrument, and this was complemented by face-to-face interviews with respondents to clarify questions, validate responses, and ensure accuracy of the data collected. The gathered information was carefully recorded, organized, and consolidated for analysis. Throughout this process, the

researchers adhered to ethical standards, maintaining the confidentiality of participants' responses and ensuring that participation was voluntary. Ultimately, the data collected provided meaningful insights into the current state of technological advancement and its effects on the operations of businesses in the specified area.

2.5 Ethical Considerations

The study ensured ethical compliance by:

- Securing informed consent from participants,
- Guaranteeing **anonymity** and **confidentiality** of responses,
- Protection of participants rights,
- Allowing voluntary participation with the option to withdraw at any time,
- Review ethics review.

2.6 Data Analysis

Collected data were encoded and analyzed using **SPSS software**. The following statistical tools were used:

- **Descriptive statistics:** Frequency, percentage, mean, and standard deviation to describe the demographic profile and assess responses.
- **Pearson r:** To examine the relationship between technological advancement and business operations.
- **T-test and ANOVA:** To determine significant differences based on demographic profiles.
- Responses were quantified using a **four-point Likert scale**, interpreted as follows:

Score	Range of means	Responses	Interpretation
4	3.26 – 4.00	Strongly Agree	Very High Technological advancement
3	2.51 – 3.25	Agree	High Technological Advancement
2	1.76 – 2.50	Disagree	Poor Technological Advancement
1	1.00 – 1.75	Strongly Disagree	Very Poor Technological Advancement

Table 1. *Demographic Profile of Business*

3. Results

FACTOR	FREQUENCY (F)	PERCENTAGE (%)
Types of Business		
Manufacturing	0	0
Merchandising	1	17
Wholesale	5	83
One-stop shop	0	0
Number of years in the business		
1 year below	0	0
2 – 4 years	2	33
5 years and above	4	67
Average monthly sales		
₱20,000.00 - ₱50,000.00	2	33
₱50,001.00 - ₱100,000.00	1	17
₱100,001.00 - ₱ 150,000.00	1	17
₱150,001.00 and above	2	33

Table 2. Summary of Respondents' Perception of Technological Advancement

Technological advancement was evaluated in three domains: **digitalization, cloud computing, and e-commerce platform.**

Factor	Mean	Std. Deviation	Description	Interpretation
Digitalization	2.2	0.99	Disagree	Poor Technological Advancement
Cloud Computing	3	1.18	Agree	High Technological Advancement
E-commerce Platform	3.53	0.62	Strongly Agree	Very High Technological Advancement
Average	2.91	0.93	Agree	High Technological Advancement

Table 3. Summary result of Business Operations

Factor	Mean	Std. Deviation	Description	Interpretation
Operational efficiency	3.5	0.47	Strongly Agree	Very High Technological Advancement
Enhance customer service	3.33	0.60	Strongly Agree	Very High Technological Advancement
Automation of calculation	3.67	0.52	Strongly Agree	Very High Technological Advancement
Average	3.5	0.53	Strongly Agree	Very High Technological Advancement

Table 4. A significant difference in effects on the technological advancement on the business operations when grouped according to the demographic profile

Profile	Business Operations				
	Operational Efficiency	Enhance Customer Service		Automation of Calculation	
		Decision on Ho		Decision on Ho	Decision on Ho
	p-value		p-value		p-value
Types of Business	< 0.05	Reject	< 0.05	Reject	No Variance in the responses
Number of years in the business	> 0.05	Accept	> 0.05	Accept	No Variance in the responses
Average Sales Monthly	> 0.05	Accept	< 0.05	Reject	No Variance in the responses
Significant if P-value <0.05 Legend: Ho is rejected if significant Ho is accepted if Not Significant					

Table 5. Summary result of Technological Advancement

Variables	Business Operations	
Technological Advancement	R	P
Strength	-0.0151	> 0.05
Interpretation	Very Weak	
	Not Significant	
<i>Legend:</i>	<i>STRENGTH:</i>	<i>INTERPRETATION:</i>
	0.00-0.19 Very Weak	$P < 0.05 \rightarrow$ Significant $p <$
	0.20-0.39 Weak	0.01 \rightarrow Highly Significant
	0.40-0.59 Moderate	$p < 0.001 \rightarrow$ Very Highly
	0.60-0.79 Strong	Significant
	0.80-1.00 Very Strong	

4. Discussion

This study explored the impact of technological advancements on business operations, focusing on digitalization, cloud computing, and e-commerce platforms. It also examined how these innovations improve operational efficiency, enhance customer service, and support automation, ultimately transforming decision-making processes and boosting overall competitiveness.

4.1 Interpretation of Results

The findings of the study revealed that technological advancement plays a significant role in shaping the performance and efficiency of small businesses in Purok 4, Imbatug, Baungon, Bukidnon. Respondents assessed the overall level of technological advancement as "high," particularly in the areas of cloud computing and e-commerce, while digitalization was found to be the least adopted. On the other hand, business operations were rated at a "very high" level, with owners emphasizing the positive effect of technology on operational efficiency, enhanced customer service, and automation of calculations. These results suggest that businesses are already benefiting from technology in streamlining their operations, even if some aspects of technological adoption remain underdeveloped.

Interestingly, statistical analysis indicated that there was no significant relationship between technological advancement and business operations, and no significant differences were observed when results were grouped according to demographic factors such as type of business, number of years in operation, or average monthly sales. This implies that while businesses are using technology in their daily practices, its impact may not yet be fully maximized, possibly due to constraints in knowledge, infrastructure, or strategic application of these tools. It also suggests that other factors—such as management skills, employee competencies, and market conditions may play an equally important role in shaping operational performance alongside technological advancement.

4.2 Comparison with Existing Literature

Based on the previously attached manuscript, the comparison between the results of the current study and existing literature reveals both alignments and affirmations with prior research.

When compared with existing literature, the findings of this study both align with and diverge from prior research. For instance, technology supports businesses in navigating complex operational challenges and optimizing resource allocation (Alvarez et al., 2022). Technology is the method by which a scientific idea is implemented in the actual world. The realm of commerce or industry, in addition to the collection of tools and other applications produced by a particular culture. Technology was currently in place and only improved as we proceed.

The utilization of data in business-to-business marketing has been well established practice for quite some time. However, in recent years, the increasing digitalization and digitalization of business-to-business firms' operational models have become the subject of significant attention. Existing literature indicates that the client firm often becomes heavily reliant on the marketing service provider's capabilities and performance (Lacity & Willcocks, 2017).

To fully embrace the advantages of digital technologies, established organizations, regardless of whether they are in the public or private sector, were compelled to integrate these technologies onto their business landscape. This integration involved a process of organizational change commonly referred to as digital transformation. Leveraging technologies to fundamentally improved business performance and customer experience (Lang V, 2021).

In terms of cloud computing, the present study resonates with the conclusions of Santos and Oliveira (2022), who identified cloud technologies as vital in providing scalability, flexibility, and cost savings. Respondents likewise acknowledged the benefits of cloud computing, particularly in managing data, improving accessibility, and supporting collaboration, which collectively enhance efficiency. However, the weak adoption of digitalization observed in this study is consistent with Martin et al. (2020), who argued that small and medium enterprises (SMEs) often face barriers such as limited resources, insufficient technical knowledge, and a lack of infrastructure. This explains why respondents in the research community rated digitalization lower than other technological advancements, as challenges in training, cost, and accessibility remain prevalent.

Technology functions in today's businesses. Chen et al. (2021) emphasized that e-commerce became indispensable during and after the pandemic as it allowed businesses to sustain operations and expand their market reach. This aligns with the present study's results, which revealed that local businesses rated e-commerce highly due to its effectiveness in boosting sales and connecting with customers beyond their immediate communities.

Similarly, Sharma (2023) highlighted that e-commerce platforms enhance cost-efficiency through automation and better inventory management. The findings of this research confirm Sharma's argument, as respondents recognized how e-commerce tools simplified customer transactions, reduced manual errors, and improved operational performance in small businesses.

Further, the response of organizations to technological changes has been facilitated by improvements in information technology. Digital organizations should build new capabilities to anticipate and respond to emerging opportunities in their business ecosystems. Therefore, convergence is necessary, and it is heavily reliant on the harmonization of strategies for information and operational technologies (Fjodor Ruzic, 2021).

Finally, the absence of a significant relationship between technological advancement and business operations contrasts with the findings of Kane et al. (2015), who stressed that digital transformation generally leads to higher performance and competitiveness. Kane and colleagues clarified, however, that technology alone is not enough; its success depends on accompanying cultural and organizational changes. This divergence suggests that while businesses in Imbatug adopt technology, the lack of strong managerial strategies and digital culture may hinder its full impact on operations.

In summary, the findings highlight that technological advancement is an important driver of modern business operations, enabling enterprises to improve efficiency, reduce costs, and expand their market reach. Tools such as e-commerce and cloud computing have proven beneficial in streamlining processes and strengthening customer service, while digitalization remains less utilized due to resource and skill constraints. The results also emphasize that technology alone is not enough to guarantee success; its true effect depends on how well it is supported by sound management practices and organizational readiness. Overall, technological advancement plays a vital role in enhancing productivity and competitiveness, but businesses must fully integrate and adapt these tools to maximize their potential benefits.

5. Conclusion and Implications of the Findings

The findings of this study carry several important implications for businesses, policymakers, and future researchers. For small businesses, the results highlight that technological advancement—particularly through e-commerce and cloud computing—can significantly improve operational efficiency, enhance customer service, and reduce costs. This implies that business owners should prioritize the adoption and integration of these technologies not only for sales and customer interactions but also for internal processes such as record management, data storage, and workflow automation.

Additionally, the study underscores the importance of providing training programs, infrastructure support, and capacity-building initiatives that will equip entrepreneurs with the skills and resources necessary to maximize the benefits of digital tools. Such interventions can address the barriers faced by small enterprises, particularly in digitalization, where adoption remains weak due to limited technical knowledge and resources.

For future researchers, the findings suggest that the relationship between technological advancement and business operations is more complex than direct cause and effect. The absence of a significant correlation indicates that other factors, such as leadership, organizational culture, and employee competencies, may influence the effectiveness of technology. This opens opportunities for further research to explore how these factors interact with technological adoption in shaping business outcomes. Understanding these dynamics can help future researchers develop more holistic models that account for both technological and human elements in organizational success.

Overall, the study implies that while technology is a powerful driver of productivity and competitiveness, its full potential can only be realized when combined with appropriate skills, strategies, and supportive environments.

5.1 Limitations

This study concentrated on examining the effects of technological advancement on business operations among selected businesses in Purok 4, Imbatug, Baungon, Bukidnon. It specifically focused on three key dimensions of technological advancement on digitalization, cloud computing, and e-commerce, and their corresponding influence on operational efficiency, enhanced customer service, and automation of calculation. The scope of the study was limited to six (6) businesses within the specified area, which may not fully represent the broader business community in the municipality. Nevertheless, the findings offer meaningful insights on how local enterprises can adapt and maximize available technologies to improve efficiency, reduce operational costs, strengthen customer relations, and enhance overall productivity. Furthermore, the study underscores the importance of continuous innovation and adaptation to technology in order for businesses to remain competitive in a rapidly evolving digital landscape.

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