Barriers and Drivers of Digital Transformation among Tourism MSMEs. A Qualitative Exploration of Challenges, Adaptation Strategies, and Digital Readiness

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ABSTRACT

This study aims to explore the development and implementation of an adaptive dashboard system to support real-time organizational intelligence through data integration, adaptive visualization, and decision-support mechanisms. Using a qualitative case study and an ADDIE-based development approach, the research collected data through interviews, observation, document analysis, and focus group discussions, then analyzed the findings inductively and validated them through triangulation. The results show that the dashboard improves information accessibility, reduces information overload, and helps users monitor key indicators more efficiently in dynamic organizational settings. The system's adaptive interface and real-time analytics also make decision-making more focused and responsive. However, effectiveness depends on data synchronization, visual clarity, and continuous refinement based on user feedback. Overall, the study demonstrates that an adaptive dashboard is not only a visualization tool but also a strategic mechanism for strengthening organizational intelligence and decision support.

I. INTRODUCTION

Currently, organizations face the need to continuously monitor operations and performance, requiring real-time dashboards that present key indicators directly to support rapid decision-making. Therefore, the development of adaptive and organizational intelligence-oriented dashboard systems becomes crucial for maintaining organizational visibility and responsiveness to environmental changes (Frempong, 2022; Hjelle et al., 2024).

Several studies indicate that the implementation of real-time dashboards does not always improve decision quality due to issues with data quality, information overload, and poor visual design. Furthermore, they face technical challenges such as multi-source data integration, meaning their usefulness has not been consistently proven across various organizational contexts. Finally, a lack of data governance can hinder the adoption of adaptive dashboards despite the availability of the technology (Ogunmokun et al., 2024).

Recent research has found that dashboards incorporating real-time analytics can accelerate decision-making time and increase user trust when data quality is adequate. Systematic reviews of adaptive dashboards show that the adaptation of interfaces and content based on user roles enhances information relevance (Weiner et al., 2016; Frempong, 2022).

Despite growing research on dashboard-based decision support, further investigation is needed to understand how adaptive dashboard systems integrate real-time data and respond to users' information needs in organizational settings (Hjelle et al., 2024). Additionally, few studies detail the mechanisms and their impact on decision-making processes across different organizational levels. Therefore, detailed case studies linking technical adaptive design to organizational intelligence outcomes in a real-time context are needed.

This study contributes to the existing literature by exploring how contextual adaptation, real-time data integration, and adaptive visualization can be combined to support organizational intelligence and decision-making. Furthermore, this research develops an evaluation model that measures technical aspects, user experience, and organizational outcomes within a single case-study framework (Singla, N. 2026).

Preliminary results indicate that recommendation explanations can reduce decision latency and increase user trust, with good data quality and governance being key prerequisites (Hjelle et al., 2024). Therefore, the focus of this research is to examine how variations in adaptive design affect organizational intelligence indicators in real-world operational situations.

This study aims to explore the development and implementation of an adaptive dashboard system and examine how its features support information accessibility, organizational intelligence, and decision-making. (Kodi, D. 2021).

II. METHODOLOGY

This study employs a qualitative case study design to explore the development and implementation of an adaptive dashboard system, with the ADDIE model serving as the framework for the system development process (Schlunegger et al., 2024; Ahmed, 2024). A case study approach is also suitable for understanding how an adaptive digital platform operates as a bounded system in organizational practice.

The researcher is present as the main research instrument and enters the organizational setting to observe platform use, interpret participant experiences, and validate the meaning of findings through direct engagement with users (Schlunegger et al., 2024). In this study, the researcher's presence is contextual and interactive because the platform's resilience and adaptability are shaped by how users experience it in daily workflows.

The subjects of the study are platform users, managers, and technical stakeholders, while the object is the Resilient and Adaptive Digital Platform as a decision-support environment that integrates adaptive dashboards, real-time analytics, and information systems integration. This object is appropriate for case study research because it is a bounded digital system whose meaning emerges from practical use and organizational context.

Qualitative data were analyzed through data organization, coding, categorization, theme development, and interpretation, while triangulation and member checking were used to strengthen the credibility of the findings. Recent studies emphasize that these strategies are essential in qualitative research because they help reduce interpretive bias and improve the traceability of findings (Ahmed, 2024).

Research and Development

This study uses the ADDIE model because it provides a structured framework for developing an adaptive digital platform through analysis, design, development, implementation, and evaluation. ADDIE is suitable for this research because the platform must be tested, refined, and aligned with user needs before it can be considered effective in practice. In the analysis stage, the study identifies user needs, organizational problems, and available data sources that will feed the dashboard. In the design stage, the interface structure, adaptive logic, and visualization flow are determined based on the analysis results. In the development stage, the dashboard prototype is built and linked to the required data sources and visualization components. In the implementation stage, the prototype is applied in the organizational setting to assess usability, relevance, and decision-support performance. In the evaluation stage, user feedback and testing outcomes are used to improve the system before final deployment. This stage ensures that the platform is not only functional, but also responsive to organizational change and decision needs.

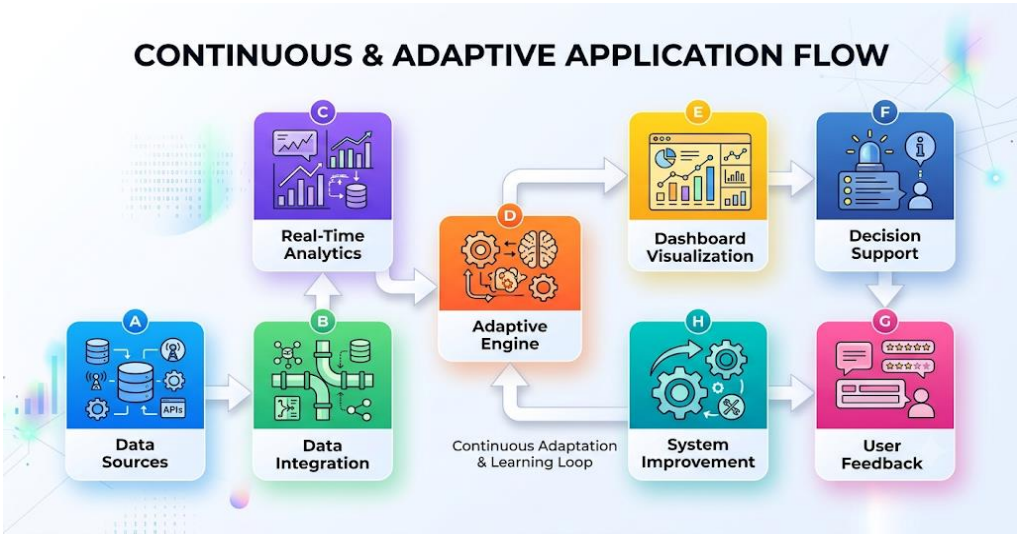

Figure 1: Variable Flowchart

Based on Figure 1 above The application flow illustrates how organizational data are collected, integrated, and analyzed in real time before being displayed in an adaptive dashboard for decision support (Dobraja et al., 2020). This flow emphasizes that the system does not only visualize data, but also adapts the information presented according to user needs and organizational context to strengthen real-time intelligence (Hjelle et al., 2024).

III. RESULTS AND DISCUSSION

The analysis stage showed that users needed a dashboard that could integrate data from multiple sources and present information in real time for faster decision-making. Interview and observation data indicated that users preferred a dashboard that was simple, adaptive, and focused on key indicators rather than dense reporting formats (Hjelle et al., 2024). The design stage produced a prototype structure consisting of data integration, real-time analytics, adaptive visualization, and decision-support features. The interface was arranged to highlight operational indicators first and provide deeper detail only when needed, which helped reduce information overload.

The development stage resulted in an adaptive dashboard prototype connected to the relevant data sources and configured to update information automatically. User feedback showed that the prototype was easier to follow than static reports because it presented current information more clearly and efficiently (Hjelle et al., 2024). The implementation findings indicated that the dashboard improved monitoring efficiency and helped users identify relevant information for decision-making, as supported by participants' interview responses and observational evidence (Frempong, 2022; Hjelle et al., 2024). Participants also reported that the adaptive display made the dashboard more useful in dynamic organizational conditions.

The evaluation stage indicated that the system was considered practical and useful for organizational intelligence because it combined integration, visualization, and responsiveness in one. However, feedback also suggested that data synchronization and visual refinement still needed improvement to strengthen the system's effectiveness (Hjelle et al., 2024).

IV. CONCLUSIONS

This study concludes that an adaptive dashboard system can support real-time organizational intelligence by integrating multiple data sources, presenting timely information, and improving decision support through adaptive visualization (Lei et al., 2023; Kovács & Szigeti, 2024). Conversely, adaptation strategies to digital transformation, such as digital skills training and business process changes, have proven to be strong drivers that increase the level of digital transformation and organizational readiness, thus in line with quantitative findings that adaptive strategies and human resource capacity building greatly contribute to the success of MSME digital transformation (RIGGS, 2025; Santarsiero et al., 2024). Overall, digital transformation functions as a key mediator between obstacles, adaptation strategies, and digital readiness, then has a positive impact on the digital performance of tourism MSMEs, which corroborates the findings of previous studies that digital readiness and the systematic adoption of digital technology can increase market access, efficiency, and competitiveness of MSMEs in the tourism sector (García Sánchez et al., 2022; RIGGS, 2025).

Table 1. Summary of Research and Development Findings

Stage	Main Findings	Interpretation
Analysis	Users needed integrated, real-time, and easier-to-read information.	The system must reduce information overload and support fast decisions.
Design	The prototype was structured into data integration, analytics, adaptive visualization, and decision support.	The dashboard should prioritize key indicators and contextual access.
Development	A working prototype was built and linked to data sources.	The system can present current information automatically.
Implementation	Users found the dashboard easier to understand than static reports.	The adaptive interface improves usability in dynamic conditions.
Evaluation	Users considered the system useful but suggested improvements in synchronization and visual clarity.	Continuous refinement is needed to strengthen performance.

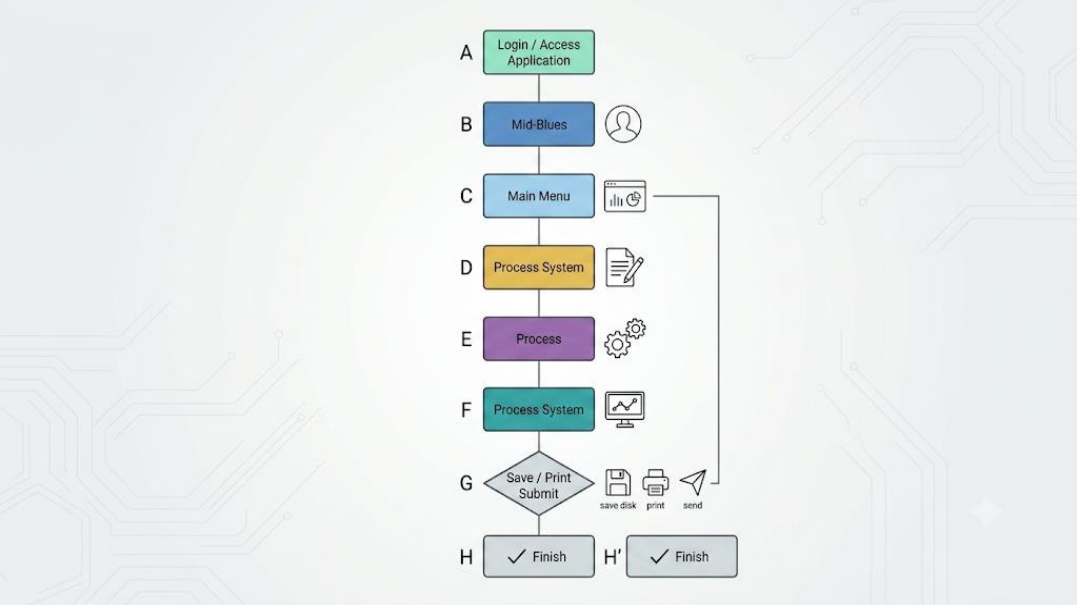

Figure 2. Research and Development Flow

Figure 2 illustrates the iterative development process of the platform, in which each stage informs subsequent improvements to enhance its adaptability and relevance for organizational decision-making.

Table 2. Relationship Between Findings and Literature

Key Finding	Supported by Literature	Discussion Point
Real-time information improves monitoring speed.	(Hjelle et al. 2024)	Timely data strengthens decision support.
Adaptive visualization reduces overload.	(Frempong 2022)	Context-sensitive display improves usability.
Dashboard quality affects decision quality.	(Hjelle et al. 2024)	Better information presentation leads to better decisions.
System effectiveness depends on integration and synchronization.	(Yigitbasioglu & Velcu 2021)	Integration is a core technical requirement.

Table 2 shows that the findings are consistent with prior studies on real-time analytics, adaptive visualization, and dashboard-based decision support. At the same time, the results highlight that data synchronization and visual clarity remain important factors for improving system effectiveness.

From a qualitative perspective, the Resilient and Adaptive Digital Platform can be understood as an integrated system that helps organizations maintain continuity while adjusting to changing operational conditions, user needs, and information demands. The platform is not merely a technical tool for displaying data, but a contextual environment that supports decision-making, responsiveness, and organizational stability during disruption or uncertainty.

The findings suggest that the platform's resilience and adaptability depend on its ability to maintain data consistency while adjusting information presentation to users' changing needs, highlighting the importance of integration and interface flexibility in organizational decision-making. In this sense, the platform supports users not only by

providing access to information, but also by helping them interpret and act on that information more effectively in real time.

Table 3. Relationship to the Application

Variable	Qualitative Meaning in the Platform	Relationship to the Application
Adaptive Dashboard System	A dashboard that changes its display according to context and user needs	It becomes the main visual interface for adaptive information delivery.
Real-Time Data Analytics	Continuous processing of current data for immediate insight	It enables the platform to respond to events as they happen.
Organizational Intelligence	The organization's capacity to convert information into actionable understanding	It is strengthened when the platform presents relevant and timely insights.
Decision Support Systems	Digital systems that assist users in evaluating information and making decisions	The platform functions as a decision aid rather than only a reporting tool.
Information Systems Integration	The connection of multiple data sources and system components into one environment	It allows the platform to operate smoothly and maintain consistency.

CONCLUSION

This study that an adaptive dashboard system can support real-time organizational intelligence by integrating multiple data sources, presenting timely information, and improving decision support in a single platform. The results show that users perceived the system as more practical than static reporting because it reduced information overload and made key indicators easier to monitor (Hjelle et al., 2024). The study also confirms that real-time data analytics and adaptive visualization are not independent features, but complementary elements that strengthen the usefulness of the dashboard in dynamic organizational settings. However, the findings also indicate that system effectiveness still depends on data synchronization, visual clarity, and continuous refinement based on user feedback (Frempong, 2022). Overall, the research demonstrates that adaptive dashboards are not only tools for displaying data, but also strategic instruments for organizational decision-making and intelligence development. Future research should test the model in multiple organizations and include longer-term performance indicators to strengthen generalizability and practical impact (Schlunegger et al., 2024)

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