

Proposed Dashboard Concept for TUS MART: Enhancing Aquaponic and Hydroponic Sales Management using the Innovation Canvas Method

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Abstract

The rapid evolution of e-commerce has transformed agricultural operations, prompting Telkom University Surabaya to develop TUS MART, an e-commerce platform designed for managing and selling aquaponic and hydroponic products cultivated by the university. However, TUS MART faces challenges such as inadequate data management, limited user interface intuitiveness, and inefficiencies in sales tracking and customer relationship management. This research proposes a comprehensive dashboard for TUS MART, developed using the Innovation Canvas Method, which aligns with both user needs and business objectives. The methodology involved phases like "Explore," "Ideate," "Market," "Design," and "Value Proposition," ensuring that the dashboard meets essential performance standards while addressing critical risks. The resulting dashboard enhances real-time inventory tracking, sales analytics, and customer management, contributing to TUS MART's operational efficiency, sustainability, and educational objectives. This study highlights the successful application of innovative design frameworks in developing user-centered e-commerce solutions that integrate technological and agricultural advancements.

Keywords: e-commerce, dashboard design, sustainable agriculture, innovation canvas method, aquaponics and hydroponics

1 Introduction

The evolution of e-commerce has fundamentally reshaped various industries, including agriculture, where technology is increasingly being leveraged to optimize operations and market reach [1], [2]. Telkom University Surabaya has embraced this trend by integrating innovative solutions into its educational and operational strategies. Among these initiatives is the development of TUS MART, an e-commerce platform designed to manage and monitor the sales of aquaponic and hydroponic products [3]. These products are cultivated within the university's agricultural projects, which serve dual purposes: promoting sustainable agricultural practices and providing a hands-on learning environment.

TUS MART plays a crucial role in the university's mission to integrate practical education with real-world applications [4]. The platform is intended to serve as a bridge between the university's agricultural output and the market, facilitating the efficient sale of these products to a broader audience[5]. However, the current iteration of TUS MART faces several challenges that impede its operational effectiveness. These challenges include a lack of integrated data management, limited user interface intuitiveness, and inefficiencies in stock monitoring, sales tracking, and customer relationship management [6]. These issues have highlighted the need for a more sophisticated system that can handle the growing complexity of the platform's operations.

In order to tackle these challenges, it has been deemed essential to develop a comprehensive dashboard for TUS MART [3]. A well-designed dashboard would allow cooperative staff and other stakeholders to efficiently manage inventory, analyse sales trends, and oversee customer interactions in real-time[7], [8]. This dashboard would function as the central hub for all operational activities, providing a user-friendly interface that simplifies the process of accessing and interpreting key data

[9]. Such a tool is vital to ensure that the platform can meet the demands of its users and support the sustainable growth of the business.

This research proposes designing and developing a dashboard for TUS MART using the innovation canvas method. This method provides a strategic framework for analysing and enhancing different aspects of a business model, such as value propositions, customer segments, key activities, and revenue streams [10]–[13]. The goal of this research is to create a dashboard prototype that not only enhances operational efficiency but also aligns with the broader goals of sustainability and innovation promoted by Telkom University Surabaya.

Previous research in the field of dashboard design for e-commerce platforms has underscored the importance of user-centered design and data integration in enhancing operational efficiency [14], [15]. Studies have shown that dashboards that effectively consolidate and visualize key metrics can significantly improve decision-making processes, leading to better inventory management, customer satisfaction, and overall business performance. Moreover, research on the application of innovation frameworks, particularly the innovation canvas method, has highlighted their effectiveness in systematically tackling complex design challenges and ensuring that technological solutions are closely aligned with overarching business objectives [16].

The proposed research is significant in several respects. Firstly, it contributes to the body of knowledge on the application of innovative design methods in the development of e-commerce platforms for agricultural products. Secondly, it addresses a practical need within Telkom University Surabaya's operational framework, offering a solution that could be adapted and implemented in similar educational and agricultural settings. Finally, the research aligns with global trends toward sustainable agriculture and technological integration [17], positioning TUS MART as a model for future developments in this field. The successful implementation of the proposed dashboard is expected to enhance the operational capabilities of TUS MART, ultimately supporting the university's mission to integrate education, innovation, and sustainability.

2 Literature Review

The design of dashboards for e-commerce platforms has been extensively researched due to their crucial role in enhancing operational efficiency and user experience [18]. Effective dashboards consolidate key metrics into an intuitive interface, facilitating real-time decision-making and business optimization [19], [20]. A focus on user-centered design is essential, ensuring interfaces are tailored to specific organizational roles and include customizable features to aid data interpretation [15], [18].

Innovation frameworks, notably the innovation canvas method, offer a structured approach to solving complex design challenges. Originating from the business model canvas [21], this framework aligns product design with business objectives, fostering cross-functional collaboration and ensuring commercial viability [10], [22]. In sustainable agriculture, particularly in managing aquaponic and hydroponic systems, technology integration is key to optimizing production processes. E-commerce platforms are increasingly used to enhance market access and profitability in agriculture, with dashboards playing a vital role in bridging the gap between production and market demand [23], [24]. Case studies reveal the practical application of dashboards in specialized e-commerce contexts, such as organic farms and hydroponic systems, highlighting the importance of user involvement in the design process to meet specific business needs [25], [26].

Despite advancements, gaps remain in integrating technological and business model aspects within sustainable agriculture. This study addresses these gaps by applying the innovation canvas method to design a dashboard for managing aquaponic and hydroponic sales on the TUS MART platform. This research aims to contribute practical insights into user-centered dashboard design, enhancing the operational and educational objectives of Telkom University Surabaya.

3 Research Method

This research utilizes the innovation canvas method to systematically design the TUS MART dashboard, incorporating several key steps to ensure that the solution aligns with both user needs and business objectives. The methodology is structured as follows **Figure 1**.



Figure 1. Research methodology

The initial phase, "Explore," involves understanding the user's needs and identifying opportunities for innovation [10]. This begins with gathering and analyzing user stories to capture the specific requirements and challenges faced by TUS MART stakeholders. Through learning sessions and stakeholder interviews, critical insights are obtained, which are then used to develop opportunity identification statements. These statements form the conceptual foundation for the dashboard design, highlighting areas where innovative solutions can address existing problems and enhance functionality.

In the "Ideate" phase, the focus shifts to generating ideas for the dashboard's features and functionalities [16]. This involves identifying the external systems that the dashboard will integrate with and defining the key features necessary to meet user needs. The key functions of innovation are determined, outlining how these features will contribute to solving identified problems. This step is crucial for conceptualizing how the dashboard will operate and interact with other systems.

The "Market" phase addresses the commercial aspects of the dashboard design [10]. This includes identifying potential revenue streams and cost structures associated with the dashboard. The research then examines customer segments to understand who will use the dashboard, and determines the appropriate channels, customer relationships, key partners, key activities, and key resources necessary for successful implementation. This comprehensive market analysis ensures that the dashboard is not only functional but also commercially viable and aligned with business goals.

During the "Design" phase, the focus is on refining the dashboard based on critical success factors and potential risks [10]. The critical success points are identified to ensure the dashboard meets essential performance and usability standards. Concurrently, critical risks are assessed to mitigate potential issues that could impact the dashboard's effectiveness. Based on these analyses, the key components of the dashboard are developed, including its interface, features, and integration capabilities, ensuring that the final design addresses both technical and user requirements [27].

The final step, "Value Proposition," involves synthesizing all previous phases to articulate the overall value that the dashboard will deliver [10]. This includes summarizing the key benefits and advantages, as well as how it addresses user needs and aligns with business objectives. The value proposition captures the essence of the dashboard's contribution to TUS MART, providing a clear statement of its impact and relevance. Adhering to this structured methodology guarantees a comprehensive development process for the TUS MART dashboard, culminating in a solution that is both innovative and effective in optimizing the management of aquaponic and hydroponic sales.

4 Results and Analysis

The innovation canvas depicted in Figure 2 provides a strategic framework for designing the TUS MART dashboard, highlighting the key components necessary for aligning the platform's features with user needs and business objectives. The canvas is structured around five key phases: Explore, Ideate, Market, Design, and Value Proposition. In the Explore phase, stakeholder insights were gathered to identify operational challenges and user requirements. The Ideate phase focused on developing innovative solutions, such as real-time inventory tracking and sales analytics, to address these needs. The Market phase considered customer segments, revenue streams, and distribution channels to ensure commercial viability. During the Design phase, emphasis was placed on refining the user interface, ensuring seamless system integration, and mitigating potential risks. Finally, the Value Proposition phase synthesized these efforts to demonstrate how the dashboard enhances operational efficiency and aligns with TUS MART's strategic goals. Together, these phases ensure a comprehensive, user-centered, and technologically sound solution that meets both business and operational objectives.

The Innovation Canvas

<h2>Explore</h2> <p>Opportunity Identification Concept Statement - Accepts/Does/Provides</p> <ul style="list-style-type: none">Optimize dashboard performance to reduce loading times and address frequent errors.Provide flexible access options (online and offline) according to user preferences.Offer features that enhance transparency in revenue reporting.Improve visual elements to increase clarity and data accessibility on the dashboard.	<p>Stories, Scenarios, and Interactions</p> <p>Users generally perceive the dashboard's usefulness to be quite varied. However, there are challenges such as some users rarely utilizing the features, finding it difficult to understand the functions, and experiencing errors on the dashboard along with long loading times.</p>	<p>External Systems</p> <ul style="list-style-type: none">Inventory Management SystemsSales Tracking PlatformsCustomer Relationship Management (CRM) ToolsFinancial Systems	<h2>Ideate</h2> <p>Key Functions</p> <ul style="list-style-type: none">Enhanced Inventory Management: Real-time stock monitoring, tracking inventory movements, and managing reordering processes.Advanced Sales Analytics: Customizable sales reports and visualizations for analyzing performance and trends.Revenue Transparency: Detailed revenue reporting and profit margin analysis.User-Friendly Interface: Easy-to-use interface that facilitates navigation.Performance Optimization: Addressing technical issues such as slow loading times and system errors.Flexible Access Options: Support for both online and offline access.Customization Capabilities: Options to add functionalities according to user needs.		
<p>Learning</p> <ul style="list-style-type: none">Identify issues related to dashboard usability, the need for additional features, and access preferences.Improve underperforming functionalities, better system integration, and enhance the user experience through a more intuitive design.	<p>Value Proposition</p> <p>The dashboard's intuitive interface, robust features, and seamless integration enhance efficiency, streamline operations, and support financial sustainability, making it a vital asset for TUS MART's growth.</p>		<p>Key Features</p> <ul style="list-style-type: none">Enhanced Inventory ManagementAdvanced Sales AnalyticsRevenue TransparencyUser-Friendly InterfacePerformance OptimizationFlexible Access OptionsCustomization Capabilities		
<p>Critical to Success</p> <p>- Metrics, Utilities, Standards</p> <ul style="list-style-type: none">User-FriendlinessPerformance ReliabilitySystem IntegrationData Accuracy and Security			<p>Revenue Streams</p> <ul style="list-style-type: none">Subscription FeesTransaction FeesCustomization ServicesAdvanced Analytics Features		
<p>Key Components/Modules</p> <ul style="list-style-type: none">The interface is designed to be intuitive and user-friendly, with a focus on clarity and ease of navigation.Integration capabilities are also a critical component, ensuring that the dashboard can effectively communicate with other systems.Real-time inventory monitoring, sales analysis, order management, and CRM tools.The ability to synchronize with inventory management software, financial reporting tools, and customer databases.	<p>Critical Risks</p> <ul style="list-style-type: none">Potential issues with integration in existing systems.Risk of user rejection if the interface is not intuitive or difficult to use.Data security risks related to the protection of sensitive	<p>Cost Structure</p> <ul style="list-style-type: none">Development Costs.Operational Costs	<p>Customer Segments</p> <ul style="list-style-type: none">Educational InstitutionsAgricultural CooperativesBusinesses in Aquaponics and Hydroponics	<p>Channels</p> <ul style="list-style-type: none">Direct SalesIndustry ConferencesOnline Marketing	<p>Customer Relationships</p> <ul style="list-style-type: none">Comprehensive SupportUser TrainingRegular Communication
			<p>Key Partners</p> <ul style="list-style-type: none">Technology ProvidersData Analytics FirmsAgricultural ExpertsFinancial	<p>Key Activities</p> <ul style="list-style-type: none">Software DevelopmentSystem IntegrationUser TrainingOngoing Support	<p>Key Resources</p> <ul style="list-style-type: none">Development TeamMarketing ResourcesCustomer Support Mechanisms
<h2>Design</h2>			<h2>Market</h2>		

Figure 2. Innovation canvas for proposed dashboard concept

a. Explore

In the "Explore" phase, user interviews revealed mixed feedback on the dashboard's usability. While some found it user-friendly, others reported infrequent use of features like ordering and faced issues with errors and slow loading times. Users suggested several improvements, including the addition of features for payments and subscriptions, as well as enhanced transparency in revenue reporting [28]. Access preferences varied, with some users valuing the flexibility of both online and offline access, while others preferred a fully online mode. The current visual design, featuring a blue and white color scheme, was generally accepted, though inconsistencies and issues with data input and visual clarity.

b. Ideate

In the "Ideate" phase, the development of the new TUS MART dashboard focused on identifying external systems, key features, and summarizing the essential functions required for an effective solution. The dashboard integrates with existing ERP and CRM systems using RESTful APIs, ensuring smooth data transfer between platforms. This integration enables real-time updates on inventory and sales data, which are processed using machine learning algorithms to generate sales forecasts [8]. The dashboard's analytics module uses AI techniques to predict customer purchasing behavior based on historical data, helping to optimize inventory management.

The process began with assessing the necessary external systems to ensure that the new dashboard integrates effectively. Key integrations identified include inventory management systems, sales tracking platforms, customer relationship management (CRM) tools, and financial systems. These integrations are crucial for synchronizing real-time data, managing inventory efficiently, tracking sales performance, and providing accurate financial reporting [29].

From user feedback and system requirements, several key features for the new dashboard were established. Enhanced inventory management, supported by Woo et al., (2019) and Mahtamtama et al., (2018), includes comprehensive tools for monitoring stock levels, tracking inventory movements, and managing reordering processes, ensuring efficient inventory control. These studies highlight that real-time web-based dashboards facilitate on-demand product management efficiently, replacing manual processes with user-friendly, intuitive electronic tools. Advanced sales analytics,

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which includes customizable reports and visualizations, were also identified as essential. These features provide users with detailed insights into their sales data, which is crucial for integrating sales and marketing operations. This integration contributes to sensemaking, impacting cost control and customer relationship performance, as discussed by Firdaus et al. (2023) and Krush et al. (2013). Additionally, revenue transparency was highlighted as a critical feature, with a focus on improving financial transparency through detailed revenue reporting and profit analysis, as noted by Matheus et al. (2020).

Another priority was ensuring a user-friendly interface, which is crucial for facilitating ease of use and reducing the learning curve for users. Vázquez-Ingelmo et al. (2020) emphasize the importance of intuitive dashboards in creating insights and facilitating decision-making processes. Performance optimization was also a significant requirement, particularly addressing technical issues such as slow loading times and frequent errors. Buttigieg et al. (2017) suggest that significant investment in financial and human resources is necessary to create an effective dashboard that aligns with organizational strategic goals. Furthermore, flexible access options were included to support both online and offline access, catering to varied user preferences and operational needs [7]. Finally, customization capabilities were identified as essential, allowing users to request additional functionalities such as payment and subscription features to meet specific needs [36].

c. Market

In the "Market" phase, several key elements for the TUS MART dashboard were identified, including potential revenue streams, cost structures, customer segments, and operational components [16]. The identified revenue streams for the TUS MART dashboard include subscription fees, which will offer users access to premium features and functionalities. Additional revenue could come from transaction fees based on the volume of sales processed through the dashboard. Customization services for specific user needs and advanced analytics features also present potential revenue sources. The cost structures involve development expenses, including software engineering, design, and system integration, as well as ongoing costs for maintenance, support, and updates [37].

The primary customer segments for the TUS MART dashboard include educational institutions, agricultural cooperatives, and individual businesses engaged in aquaponic and hydroponic farming. Within these segments, the dashboard users are likely to be staff responsible for inventory and sales management, administrators overseeing operations, and financial personnel handling reporting and analysis. In addition, Marketing efforts for the dashboard will utilize various channels, including direct sales, industry conferences, and online marketing [38]. Online strategies will include webinars, social media promotions, and content marketing to generate interest and attract potential users. Maintaining strong customer relationships will involve providing comprehensive support, conducting user training sessions, and ensuring regular communication to address feedback and enhance satisfaction [39].

Key partners essential for the successful implementation of the dashboard include technology providers for system integration, data analytics firms for advanced reporting features, and agricultural experts for domain-specific insights [40]. Partnerships with financial institutions will also be important for facilitating secure transactions and managing revenue. Moreover, critical activities for developing and deploying the dashboard include software development, integration with external systems, user training, and providing ongoing support. Required resources include a skilled development team, technical infrastructure for hosting and maintaining the dashboard, and marketing resources to promote the product. Establishing robust customer support and feedback mechanisms will also be vital [41].

d. Design

In the "Design" phase of the TUS MART dashboard development, critical success factors and risks were identified, followed by the specification of key components necessary to meet both technical and user requirements. The critical success factors for the TUS MART dashboard include user-friendly interface design, reliable performance, and seamless integration with existing systems. A well-designed user interface is crucial for ensuring that users can navigate the dashboard with ease, enhancing overall user satisfaction and productivity [42]–[44]. Reliable performance, including fast loading times and minimal downtime, is essential for maintaining user trust and preventing disruptions in daily operations. Seamless integration with existing systems, such as inventory management and financial reporting tools, is vital for creating a cohesive platform that meets the

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operational needs of the users [45]. Identified critical risks include potential issues with system integration, user adoption, and data security. Integration challenges could arise if the dashboard does not effectively communicate with existing systems, leading to data inconsistencies or operational inefficiencies [18]. User adoption is another significant risk, particularly if the dashboard's interface is not intuitive or if users are resistant to change [14]. Data security risks must also be managed, ensuring that sensitive information is protected against unauthorized access or breaches [46].

The key components of the TUS MART dashboard were identified as its interface, core features, and integration capabilities. The interface is designed to be intuitive and user-friendly, with a focus on clarity and ease of navigation. It includes customizable dashboards that allow users to personalize their view according to their specific roles and responsibilities [36]. Core features of the dashboard include real-time inventory tracking, sales analytics, order management, and customer relationship management tools. These features are designed to provide comprehensive support for managing aquaponic and hydroponic sales, from tracking stock levels to analyzing sales trends. Integration capabilities are also a critical component, ensuring that the dashboard can communicate effectively with existing systems [45]. This includes the ability to sync with inventory management software, financial reporting tools, and customer databases. The design ensures that data flows seamlessly between systems, reducing the risk of errors and improving overall efficiency.

e. Value

The "Value Proposition" phase synthesizes the outcomes of all previous phases, offering a comprehensive view of the TUS MART dashboard's overall value. The dashboard is designed to provide a range of key benefits that directly address user needs and align with the strategic objectives of TUS MART. Its intuitive interface, robust feature set, and seamless integration capabilities create a powerful tool for managing aquaponic and hydroponic sales. By facilitating real-time inventory tracking, streamlined order management, and detailed sales analytics, the dashboard enhances operational efficiency and decision-making processes. Additionally, the subscription-based revenue model and potential for customization provide TUS MART with a sustainable financial foundation, while the strong focus on user experience ensures high adoption rates among key stakeholders [47]. These elements combine to position the dashboard as a critical asset in supporting TUS MART's growth and sustainability.

Figure 2 illustrates the Innovation Canvas framework for designing the TUS MART dashboard, aligning its features with user needs and business goals. A comparison with the current system revealed several improvements:

1. **Real-Time Inventory Tracking:** The proposed dashboard offers real-time stock updates, significantly enhancing operational efficiency by reducing manual inventory errors and delays [48]. It is projected to cut inventory inaccuracies by 35% and restocking response times by 25% [41]. These improvements are expected to boost customer retention by 15% [41].
2. **Enhanced Sales Analytics:** The dashboard incorporates advanced sales analytics, providing detailed insights into sales performance, customer purchasing behavior, and revenue trends. This feature is absent in the existing system, making decision-making slower and less informed.
3. **Seamless System Integration:** The new system integrates with external tools such as inventory management and customer relationship management (CRM) platforms, unlike the current system which operates in silos.
4. **Improved User Interface:** Feedback from users highlighted that the new dashboard's interface is more intuitive and user-friendly. This contrasts with the older system which was often described as confusing and outdated.

The dashboard integrates real-time data across inventory, sales, and customer management, reducing manual entry and minimizing errors. Its analytics use AI to predict sales trends and customer behavior, enhancing decision-making, cutting costs, and improving user satisfaction, positioning TUS MART for greater scalability and performance.

5 Conclusion

This research successfully developed a user-centered dashboard for TUS MART, aimed at improving the management and sales of aquaponic and hydroponic products at Telkom University

Surabaya. Through the Innovation Canvas Method, the study systematically addressed user needs, identified essential features, and created a design that integrates with existing systems while mitigating critical risks. The "Explore" phase highlighted the need for an intuitive interface and reliable performance, guiding the design of key features such as real-time inventory tracking and sales analytics. The "Ideate" and "Market" phases ensured the dashboard's alignment with TUS MART's business objectives, focusing on sustainable revenue models and effective user engagement. The final design, informed by critical success factors and potential risks identified in the "Design" phase, resulted in a technically robust and user-friendly tool. The "Value Proposition" underscores the dashboard's contribution to operational efficiency and strategic decision-making, supporting TUS MART's mission of integrating innovation with sustainable agriculture. In summary, this research demonstrates the successful application of the Innovation Canvas Method in developing a dashboard that meets both user needs and organizational goals, positioning TUS MART for continued success.

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