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## **Collaborative Platform Empowerment: Case Study in the Digital Transformation of the Interior Design Industry**

(Full Paper)

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### **ABSTRACT**

As the applications of digital technology matures, how to implement digital services and project management capabilities for interior design companies has become an important topic. This research is conducted with a case study method that solves the pain points of designers by introducing a digital empowerment platform as a collaborative service solution for designers. The research results show that the establishment of the platform for cross-industry collaborative mechanisms will reduce the construction period and internal management costs indirectly drive the overall operating efficiency of the interior design industry.

*Keywords:* Digital transformation, platform, platform empowerment, interior design industry

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### **INTRODUCTION**

The rapid development of digital technology has impacted all walks of life, and the company's management rethinks how to make internal innovations in response to the external market environment. In the long run, the strategic goals of these digital transformation are all hoping to increase the company's value creation (Chanias & Hess, 2016). The interior design market has been around for a long time. The Ministry of the Interior has registered 11,090 of the national interior decoration industry, with a total of 26,088 professional and technical personnel. Its composition structure is mostly small and medium-sized enterprises and micro-firms, and the annual output value of the industry has reached NT\$130 billion. This year the world has been affected by the COVID-19 pandemic and the continuation of the China-US trade war, which has driven many Taiwanese businessmen from all over the world to return to Taiwan. As a result, the demand for buying new houses and rebuilding houses has increased significantly (Chen, 2019). In addition, the demographic changes such as elder care issues and declining birth rates have also had significant impact on interior design, market behavior and the overall social development of the domestic economy (Xiao, 2004).

The B2C platform has developed maturely for interior design companies and consumers. Consumers with maintain houses or rebuilt needs can easily find designers or renovation worker through the platform, but in the management of B2B projects between interior design companies and outsourced workers are still in manual and paper operation mode currently. Although there have been attempts by information service providers to develop the interior design project management system in the past, but most of the construction workers were older and weak in information application capabilities, and were repulsive or fearful of technology products, which led to their low willingness to use, so it was not easy to implement, and promotion are not effective. To this end, this research aims at the project management requirements of the interior design outsourcing work category, including project schedule planning, outsourcing inquiries and quotations, cost summary, project progress management and project acceptance, administrative closing and other functions to carry out digital designer's discussion on service solutions and value creation models of empowerment platform.

### **LITERATURE REVIEW**

#### **Digitalization Brings Disruptive Innovation to Various Industries**

Technology always renews itself and adapts to the needs of each generation. How an enterprise invests in innovation and strategic application and choice has a key impact on whether the enterprise can operate in a sustainable manner, and there is a high risk. Many unpredictable competitors based on technological innovation have disrupted the original rules of the game for prices, services and the industry, making the original traditional industry operators unexpected. Therefore, modern enterprises are experiencing the transformative effects of digitalization on technologies in the external environment, such as competitive dynamics or customer expectations, as well as their internal environment expectations—from related business models and services provided to the organization and product structure (Downes & Nunes, 2013; Lucas & Goh, 2009; Porter & Heppelmann, 2014). Terms such as "digitalization", "digitalization" and "digital transformation" describe the impact of how technology and processes are used that

affect our daily work and the way we conduct business (Zigurat, 2019). Digitization is about converting analog information and converting it into zeros and ones so that computers can process and transmit it (Bloomberg, 2018). From the perspective of digital transformation, the business perspective is about how to use digital technology and data to generate more revenue, improve the business and create a digital culture in the company (Hapon, 2018). Routine tasks can be automated, and if used properly, it can provide employees with a better working environment. Through digitization, other tasks (such as restoring and retrieving data) will become easier (Parviainen *et al.*, 2017).

### **Definition of Digital Transformation**

The definition of digital transformation is as follows: "Using new digital technologies (social media, mobile, analytics or embedded devices) to achieve major business improvements" (Fitzgerald *et al.*, 2013, p. 4). In other words, digitization and digitalization are part of digital transformation. Digital transformation covers all aspects of the business, such as customer understanding and touch points, growth strategies, enterprise mobile applications, process digitization, employee capabilities, performance, new business models, etc. It brings a whole new market, as well as new customers and business realities.

### **COVID-19 Has Accelerated the Change of Industry Development and Consumer Behavior Patterns**

There is a high degree of trust between interior design companies and decoration workers. For designers, the use of materials, construction quality, personnel management, and schedule coordination for the construction workers, they are the key to the success of the interior design. For the interior design industry, whether it is easy for the designer to communicate and coordinate, the execution of construction drawing revision, and the collaboration of multiple construction teams on the site will affect whether the interior design team can complete the work smoothly as scheduled. Designers generally have a certain degree of digitization. Usually, they only need a pen, a drawing board and a computer to go to the field to receive cases, and the mobility is high. But for workers, it is relatively difficult to move the tools required for construction. Especially for those who want to go to other counties and cities to accept cases or carry out construction, they must consider whether to accept increased travel and accommodation costs.

On the other hand, it is normal for a team of construction workers to conduct multiple designer cases in the same area at the same time. Unless it is a particularly high-budget interior design case or a designer's fixed contractor, frequent travel between multiple counties and cities will cause many questions. Affected by the Covid-19 epidemic, even if the designer can accept the case, the shortage of construction manpower and imported materials is still very serious (Chen & Huang, 2020). It is foreseeable that there will be delays in construction progress, shortage of materials, and even work difficulties in the future. This situation is likely to continue to intensify.

### **The Digital Transformation of the Interior Design Is a Top Priority**

"My country's residential interior design industry will become one of the important construction industry categories, and it should be emphasized and in-depth research field" (Zeng & Jiang, 1985). Generally, interior design companies will propose complete life solutions and planning suggestions based on customer needs and side observations. The construction period may be 3 to 4 months, or even more than a year. Whether it is the communication of owner/customer needs, construction site measurement and evaluation, design drawings and construction drawings, outsourcer coordination, furniture configuration and purchase, kitchen and bathroom equipment installation, and even installation of IoT smart home appliances, all items and processes are equivalent complicated.

Although there are already many information service companies in the market that provide ERP systems for business operation management, the current project management in the interior design industry still relies on a large amount of manpower and paper operations. In addition, during the construction period, different outsourcers often need to enter the owner/client's home to work at the same time. How to properly dispatch manpower to control costs, and effectively connect the project and management progress, resulting in budget cost control and project connection, etc., for most the interior design companies have a heavy burden. In summary, the purpose of this research is to provide a better understanding of the phenomenon of digital transformation by providing basic insights into the interior design industry, assist the company in establishing business collaboration relationships with other companies, and focus on its core business to complete the mid- to long-term Project development strategy.

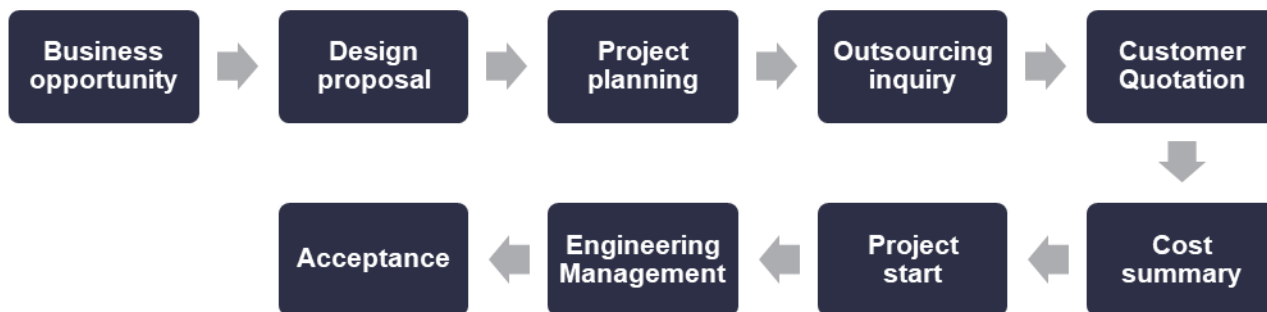
## **RESEARCH METHOD**

A research question is a question that a researcher is set out to answer. It is the driving force for most empirical studies (Yin, 2014). For the phenomenon that occurs in real life background, case study is a more commonly adopted strategy (Yin, 2002). Case study is to clarify the problem, determine the proposition and design to be analyzed, and through collection, Analyze and interpret data to establish a rich theory (Benbasat, Goldstein & Mead, 1987). Therefore, the literature review of this study first, then uses the "systematic interview" in the case study of Yin (1984) as the main research method, and finally uses the analyst triangulation

method of Patton (1980) to conduct a holistic analysis of the interviews and collected data, and re-examine the research findings to obtain research results.

**Interview and System Analysis**

Firstly, we conducted individual interviews with 6 interior design companies and their construction workers, and summarized their common operating procedures, including: business opportunities, project opening, design content proposal, project planning, outsourcing inquiry and customer quotation, and the other detailed tasks such as cost summary, project start-up, project execution management, acceptance check, and administrative closing, see Figure 1.



Source: This study.

Figure 1: The interior design operation process

Then discuss and determine several important nodes in the whole process with the system integrator (namely the case company), including: project schedule management, project cost management, subcontractor management, labor dispatch and scheduling, etc., and merge them into the collaborative project in the management model to simplify management operations, and digital services to improve operational management efficiency, see Table 1.

Table 1: Interior design camp work inventory

Management Item	The operation status
Project progress	<ul style="list-style-type: none"> <li>Supervisors or designers need to ask the person in charge of each project to understand the progress of the project.</li> <li>The on-site construction supervisor arranges the paper records of the relevant project by manual work and reports orally by telephone.</li> </ul>
Project cost	<ul style="list-style-type: none"> <li>Collecting and issuing operation manually summarizes various outsourcing quotation data of the project, and summarizes it into an outsourcing cost table.</li> </ul>
Outsourcer Information	<ul style="list-style-type: none"> <li>Collected by the procurement personnel from the manufacturer from time to time, and the latest product and technical data are collected manually.</li> </ul>
Vendor scheduling	<ul style="list-style-type: none"> <li>When inquiring about the individual renovation projects, the designer’s purchaser/project management staff verbally asked the outsourcer about the available construction time.</li> <li>After all the outsourcers have confirmed their time, they will be manually compiled into a form.</li> </ul>

Source: This study.

**System Design and Platform Optimization**

According to the above operating conditions, including system analysis, system architecture establishment, system function design, information flow design, collaborative management operations, etc. This research first compares the functions and execution systems of the existing project management platform of the case company. After upgrading and redesigning the platform interface, expand the inclusion of all stakeholders in the interior design industry, such as designers, construction workers, furniture dealers, kitchen and bathroom equipment manufacturers, air conditioners, lighting and electromechanical, smart home appliances, etc. To

improve the cross-domain integration of different industry processes, and by repositioning the service entry point of each industry in the interior design process, we have developed a cross-domain cooperation mechanism and platform viscosity, and developed a platform system solution that meets the characteristics of the interior design industry platform.

### LINE Service Integration Applications

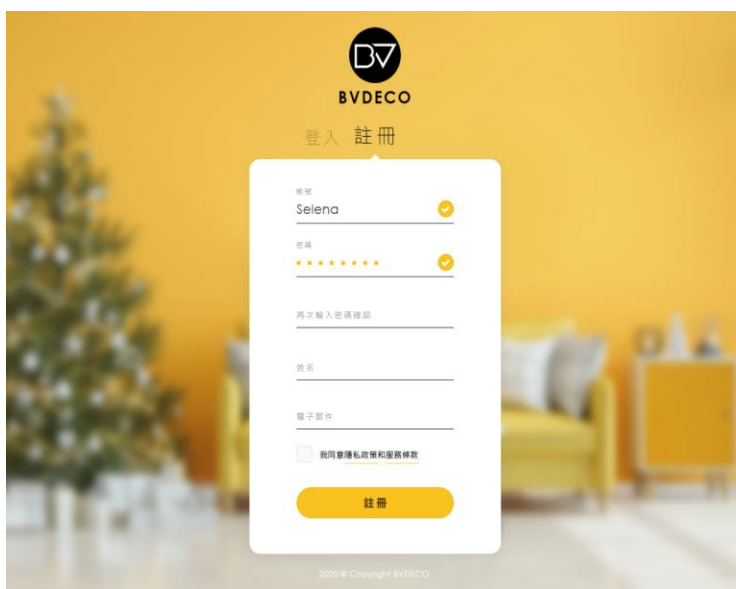
The interview results show that LINE has almost become the only communication channel in Taiwan's interior design industry. Designers and construction workers use LINE to communicate and transfer pictures so that they can interact and report the progress of the project at any time. Considering that construction workers are less likely or inconvenient to use technology products, traditional computer operations are difficult for interior design teams to adapt and operate, and to prevent preconceptions and resist the use of innovative platform service systems. This research also develops the LINE interface, which provides interaction between designers and construction workers and owners/customers as a gateway to information exchange and to the Web platform.

## RESULTS AND DISCUSSION

This research sets designers as early users and provides their digital authorization platform service solutions for their project management, including project schedule, budget and outsourcer management, delivery project submission and communication channels for owners/customers. All records will be saved in the cloud database. On the other hand, for construction workers and other users with weak digital capabilities, it is planning to build the LINE@Designer authorized platform APP, and then import it back to the Web platform for use. Through the LINE @Richmenu service, we hope to use different digital levels, it is easy to collaborate and invite its customers to join and link to become an exclusive channel.

Up to now, the designer empowerment platform has completed the first phase of system testing, and its functional modules include:

- (1) Client login page: This is an entrance for designers to establish communication with owners/clients and reveal progress. After clicking, Client can directly log in to the account password set, browse project information and contact their designers. If the visitor is not a member yet, he can register directly here to obtain information about designers and the interior design industry.



Source: This study.

Figure 2: Platform login page

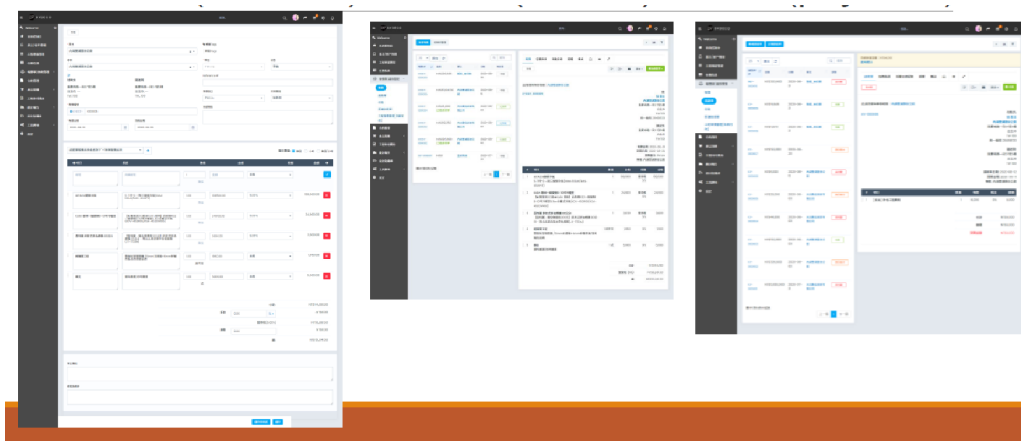
- (2) Project schedule management module: This is a module that provides designers with internal project progress management. After clicking and logging in the account password, the designer or assistant can quickly enter the project status table (Dashboard), clearly sort the necessary project tasks, friendly interface reminders and when to-do items arrive, and intelligently track timetables and cost calculations. In addition, the designer can view all the work in progress at the same time, and can perform work shift manpower scheduling and schedule deployment at any time.



Source: This study.

Figure 3: Project progress page

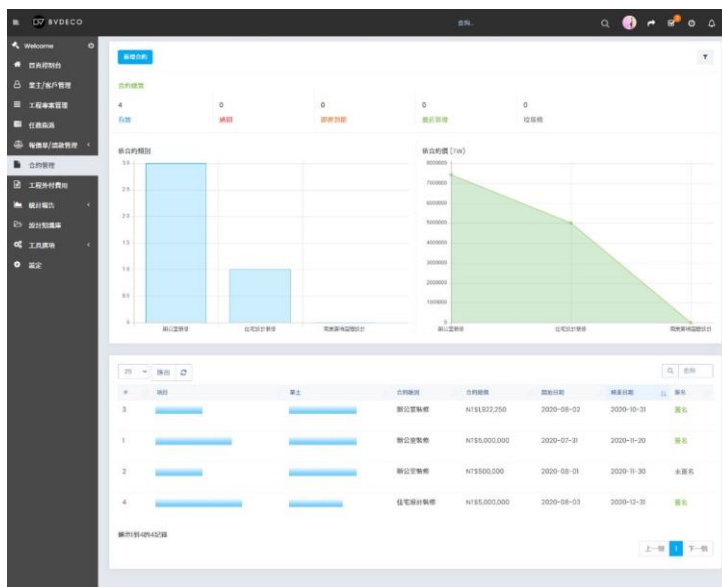
- (3) Supplier material/construction worker shift list query and customer quotation module: This is a special module for commercial catalogs for designers and construction workers, as well as material suppliers. After the member clicks and logs in the account password, the material supplier can freely update the product and the latest quotation, and the designer can check the price according to the demand item at any time, browse the product catalog and inventory database. After the designer selects the item, the system will create an inquiry form to make an inquiry to the supplier/construction worker. After replying, the system will generate an email or line to automatically complete the process mechanism of the customer's quotation.



Source: This study.

Figure 4: Quotation/Request/Receipt page

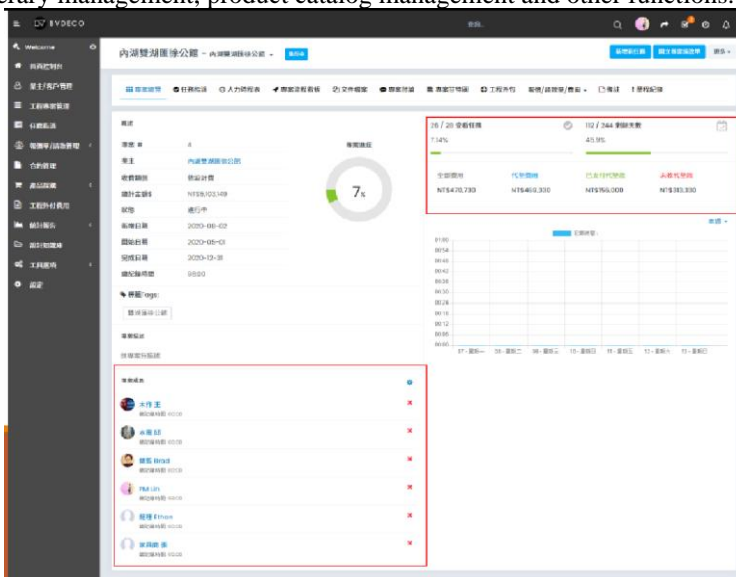
- (4) Invoice issuance/receivable and payable management module: This is a module that provides designers with internal financial management. After clicking and logging in the account password, the designer or assistant can select the project progress item as completed status, submit the accountant to issue an invoice online, and record the content of the outsourcer's work and the delivery time of the product or construction. The system can also receive project revenue time comparison to ensure the balance of cash flow and revenue and expenditure, accurately grasp the financial status.



Source: This study.

Figure 5: Financial management page

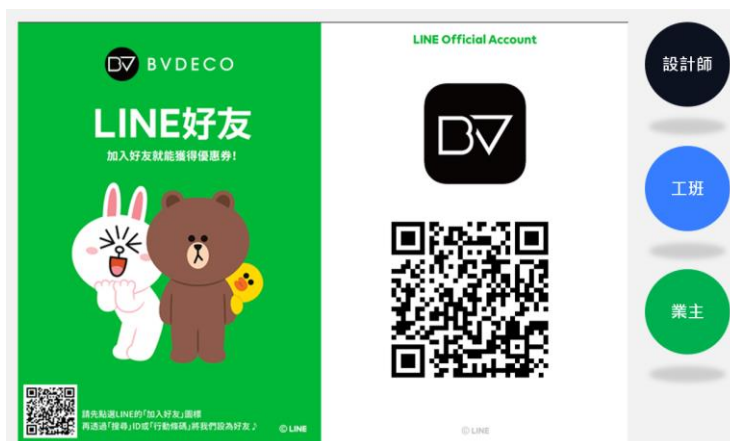
- (5) Customized exclusive management platform: This is a mode that provides designers with self-configuring interfaces and functions. After the member clicks and logs in the account password, they can enter their exclusive account management platform to establish an interface style, and use his own logic to manage suppliers, customer information, project information, financial information, itinary management, product catalog management and other functions.



Source: This study.

Figure 6: Customized exclusive page

- (6) Smart Customer Service Assistant: This is a Line@ interface specifically for designers/construction workers/owners or customers. Members click to activate the LINE Bot robot AI to answer questions and guide each user to find the answer step by step. If each answer does not satisfy the question asked, you can send a message to the system personnel through LINE for manual customer service. Or, anyone can leave a comment or provide feedback to the system administrator through form data. This feature can make subsequent system iterations and services better.



Source: This study.

Figure 7: Service entrance screen of the LINE Mini platform

In addition to the functional modules mentioned above, for the entire interior design industry, high mobility, simple operation and foolproof mechanisms are also necessary factors to increase the utilization rate of all practitioners. Therefore, the platform design must use RWD technology to upgrade the traditional operating mode of existing computer desktops or laptops to multiple carriers, such as smart phones and tablet computers, all of which have easy-to-use and easy-to-read operation interfaces.

## CONCLUSION AND RECOMMENDATIONS

This research found that empirical results such as cross-industry design process integration research, system interface redesign, and end-user research that promote the interior design industry have all received positive responses from participants, indeed meeting the needs of designers. It also meets the expectations of the digital transformation of the interior design industry. For users with weak digital capabilities in the interior design industry, such as construction workers, they can connect to the system platform through an easy-to-learn interface to quickly manage various tasks, quotations and send messages, without having to search for information or products every time, and can quickly create themselves product database and catalog of LINE are very convenient. And the use channel of LINE built by the platform system allows users who do not use the system platform but can use LINE to use the menu guidance and smart customer service of LINE@. Learn new digital tools incrementally. For users with mature digital information technology, they can directly use the platform module to carry out project management, process management, drawing management, inquiry and quotation management, staff class management and other business management tools, and can further obtain many brand products Catalog information and dealer information, easy to manage quotations and costs.

In other word, the case study also confirmed that material suppliers and construction workers can actively create their own product lines and catalogs, which is very convenient for cross-industry business integration with interior designers. Anyone can easily connect to the system platform and quickly manage and execute various assigned tasks without changing habits and tool interfaces. It also proves that cross-industry platform collaboration has high business opportunities and important management implications.

Research restrictions include:

- (1) This research is a specific target (i.e., the designer has a certain reputation, the average private house receives a case amount of more than NT\$ 4 million, will use at least one design software such as AutoCAD, etc.), so the research results are divided by the number of samples Too little, further research is needed on the effectiveness of the research.
- (2) The platform system does not charge any fees during the demonstration process. Will the user feedback results be the same if the fees start in the future?

Future research directions:

- (1) It is recommended that the research objects in the future can be expanded. In addition to the designers, the construction workers and the owners/end-users can be added to further discuss the problems and needs of collaboration and use to increase the incentives for the use of digital tools.
- (2) The proposition of this research can be revised, and the research results can be confirmed by platform data or quantitative analysis.
- (3) Assist the case company to observe the use of the digital empowerment platform for a long time, and propose the use context and business model of the designer's digital empowerment platform. Through the interior design industry information platform and interface, construct an open and transparent online matching mechanism and profit-sharing model.



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