Taxonomizing Visa Information and Processes Using Design Thinking to Develop a Digital Platform for International Students at the Faculty of Humanities, Chiang Mai University

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Abstract

International students often face challenges in accessing visa-related information and navigating immigration procedures during their studies. Fragmented information sources, procedural uncertainty, and complex administrative requirements can create confusion, increase anxiety, and negatively affect students' overall experience. This study aimed to explore the visa-related challenges experienced by international students and develop a digital platform prototype to support visa information management and processes at the Faculty of Humanities, Chiang Mai University. A qualitative research approach was employed using the Design Thinking framework, consisting of the Empathize, Define, Ideate, Prototype, and Test stages. Data were collected from international students and knowledge workers involved in visa-related services through semi-structured interviews, focus group discussions, and usability evaluation. Thematic analysis and Customer Journey Mapping (CJM) were used to identify user experiences, pain points, and service gaps throughout the visa journey. The results revealed four key problem domains: information fragmentation, procedural uncertainty, psychological burden, and administrative complexity. Based on these findings, six core platform features were developed, including a dashboard overview, visa journey guidance, document checklist, alerts and reminders, support services directory, and knowledge-based taxonomy. Usability evaluation indicated positive user perceptions regarding information clarity, ease of use, procedural understanding, and overall usefulness of the platform. The study demonstrates that integrating Design Thinking with knowledge management principles can support the development of effective digital solutions for international student services. The proposed platform offers a practical approach to improving access to visa-related information, reducing procedural confusion, and enhancing support experiences for both students and administrative personnel. The findings may serve as a foundation for future development of digital support systems within higher education institutions.

Keywords: Design Thinking; SECI model; digital platform; visa information and processes; international students

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Introduction

The internationalization of higher education has become a defining feature of the global academic landscape, driven by the increasing interconnectedness of economies, societies, and knowledge systems. This process involves the integration of international, intercultural, and global dimensions into teaching, research, and institutional services (Knight, 2004). A key component of internationalization is student mobility, which refers to the movement of students across national borders to pursue educational opportunities. Student mobility not only enhances academic knowledge and professional competencies but also fosters intercultural understanding, global awareness, and adaptability skills that are essential in an increasingly globalized world (Altbach & Knight, 2007). In parallel, the concept of global education emphasizes the development of learners who are capable of engaging with complex global challenges through critical thinking, cultural sensitivity, and cross-cultural communication. As a result, higher education institutions worldwide are increasingly adopting internationalization strategies to attract international students, expand academic networks, and strengthen their global competitiveness.

In Thailand, the internationalization of higher education has been actively promoted as part of the national strategy to position the country as a regional education hub. Universities have expanded international programs, academic partnerships, and student exchange initiatives to attract a growing number of international students, particularly from Asia. The growth of international students in Thailand provides important evidence of the country's increasing role in regional higher education mobility. According to Thailand.go.th (2023), Thai higher education institutions enrolled 34,202 international students in the first semester of the 2022 academic year, reflecting a continuous increase over the previous five years. The report also shows that a large proportion of these students came from Asian countries, particularly China, Myanmar, Cambodia, Laos, and Vietnam. This pattern suggests that Thailand has become an increasingly attractive destination for students within the region, supported by its expanding international programs, geographical proximity, cultural familiarity, and academic cooperation with neighboring countries. Therefore, the rising number of international students can be seen as a practical outcome of Thailand's higher education internationalization policy and its broader ambition to strengthen its position as a regional education hub.

Chiang Mai University hosts a substantial number of international students across all degree levels, totaling 2,276 students. The majority are enrolled at the bachelor programs (1,118 students), followed by master programs (685 students) and doctoral programs (472 students) (CMU International Relations Administration Center, 2026). Particularly, the Faculty of Humanities ranks fourth among all faculties, with 207 international degree students, placing it within the top five contributors to the university's international student population. This represents approximately 9.1% (207 students) of the total international degree students, indicating the faculty's significant institutional role in attracting global learners. Such a contribution reflects the Faculty of Humanities' strategic position in supporting the university's internationalization agenda, particularly through academic offerings in language, culture, and interdisciplinary studies that appeal to international students.

The Faculty of Humanities, Chiang Mai University, has continued to attract international students through both degree and non-degree programs. Between 2022 and 2025, enrollment in the Bachelor of Arts Program in Humanities and Sustainability (BAHS) showed a generally positive trend, increasing from 14 students in 2022 to 20 students in 2024, before slightly declining to 17 students in 2025. Meanwhile, the Bachelor of Arts in Thai as a Foreign Language (TFL) remained relatively stable between 2022 and 2024 but increased to 30 students in 2025 (Faculty of Humanities, Chiang Mai University, 2025). The continued participation of

exchange students also reflects the faculty's active engagement in international academic mobility. These trends suggest that the Faculty of Humanities plays an important role in supporting Chiang Mai University's internationalization agenda.

Nevertheless, the growing number and diversity of international students have also identified administrative challenges, particularly in visa management. Students are required to navigate multiple procedures, including visa application, conversion, extension, and termination, while complying with immigration rules and preparing required documentation. Khanal and Gaulee (2019) note that international students often face difficulties in accessing accurate and timely information, especially during the pre-arrival and transition periods. When institutional information is fragmented or unclear, students may rely on informal sources such as peers, online communities, or outdated documents, which can increase confusion and procedural errors. Youm et al. (2026) further demonstrate that recurring questions and unmet information needs in online forums reflect persistent gaps in institutional support and information provision.

In the Thai context, these challenges are particularly relevant because visa procedures involve multiple layers of immigration rules, document requirements, and administrative processes. At the Faculty of Humanities, students come from different academic backgrounds, program types, and mobility durations, including full-time degree students and short-term exchange students. The absence of a centralized, accessible, and user-centered visa information platform represents an important gap in institutional support. Addressing this gap is essential for improving students' administrative experience, reducing procedural errors, and strengthening the faculty's broader efforts toward internationalization.

Therefore, this study aims to explore the challenges and needs of international students regarding visa-related information and processes and to develop a digital platform prototype by integrating Design Thinking and Knowledge Management tools. Although previous studies have addressed international student support, information accessibility, user-centered design, and digital service platforms, limited attention has been given to how fragmented visa-related knowledge can be systematically categorized and transformed into a user-centered digital support platform within a faculty-level higher education context. This gap is particularly important because visa processes involve not only formal regulations and institutional documents, but also tacit knowledge from staff experience, students' practical concerns, procedural variations, and recurring service problems.

Literature Review

1. Design Thinking

Design Thinking is a human-centered approach for addressing complex and ill-defined problems, particularly in contexts that require user-centered solutions and adaptive innovation. Brown (2008) explains that Design Thinking integrates desirability, feasibility, and viability, allowing solutions to respond to human needs while remaining technically and organizationally practical. Liedtka (2018) further emphasizes that Design Thinking reduces uncertainty through iterative learning, experimentation, and continuous engagement with users. Rather than relying solely on top-down problem solving, this approach prioritizes empathy, co-creation, feedback, and experiential learning to ensure that solutions are relevant and usable.

The Design Thinking process is commonly organized into five iterative stages: Empathize, Define, Ideate, Prototype, and Test. The Empathize stage focuses on understanding users' experiences, needs, and challenges, while the Define stage synthesizes these insights into a clear problem statement. The Ideate stage encourages the generation of possible solutions, followed by the Prototype stage, where ideas are translated into tangible forms such

as mock-ups or digital models. The Test stage allows users to evaluate the prototype and provide feedback for further improvement. These stages are not strictly linear but cyclical, enabling continuous refinement as new insights emerge.

In educational and digital contexts, Design Thinking has been widely applied to strengthen problem-solving, creativity, and user engagement. Razzouk and Shute (2012) highlight that Design Thinking supports learning by connecting theoretical knowledge with real-world problem solving, while Chujfi and Meinel (2020) suggest that it contributes to cognitive development and institutional learning. Beckman (2020) also emphasizes the importance of problem framing and reframing, arguing that complex problems should be continuously redefined before solutions are developed. This is particularly relevant in contexts where users face uncertainty, fragmented information, or procedural complexity.

Design Thinking is also closely connected to knowledge management because it supports the process of capturing, organizing, sharing, and applying knowledge in ways that are meaningful to users. Carlgren et al. (2016) highlight the role of users as active contributors in the design process, suggesting that users' experiences and feedback can directly inform solution development. In digital platform development, this approach helps transform complex and fragmented information into structured, accessible, and actionable knowledge. Örnekoğlu Selçuk et al. (2022) demonstrate that Design Thinking can support the creation of online learning platforms that respond to users' needs through features such as personalization, accessibility, interaction, and communication.

Overall, Design Thinking provides a useful theoretical and practical framework for developing user-centered digital solutions. Its emphasis on empathy, iterative problem solving, user participation, and knowledge organization makes it particularly relevant for addressing challenges related to information accessibility, procedural complexity, and user understanding in educational settings. In this research, the Empathize stage supports the exploration of students' experiences, needs, and pain points regarding visa processes. The Define stage enables these insights to be synthesized into key problem domains, while the Ideate stage supports the translation of identified problems into possible platform features. The Prototype stage allows the proposed solution to be visualized as a digital platform that organizes visa-related knowledge into accessible categories, and the Test stage provides user feedback on the clarity, usability, and usefulness of the prototype. Therefore, Design Thinking serves as the main framework that captures user experience, knowledge organization, and digital platform development in this study.

2. Thematic Analysis

Thematic analysis is a flexible qualitative method for identifying, organizing, and interpreting patterns of meaning across textual data. Braun and Clarke (2006) explain that thematic analysis enables researchers to systematically examine qualitative data and develop themes that reflect issues relevant to the research questions. Braun and Clarke (2022) further emphasize that thematic analysis is not merely a coding technique, but an interpretive and conceptually informed process in which research questions, data collection, coding, and theme development should be clearly aligned. This makes thematic analysis particularly suitable for studies that aim to understand users' experiences, needs, problems, and expectations in a specific organizational context.

The process typically begins with repeated reading of the data, followed by the generation of initial codes that represent meaningful ideas, experiences, or recurring concerns. These codes are then compared, grouped, and refined into broader themes. Saldaña (2021) notes that coding is an analytical process through which researchers gradually construct

meaning from data. Therefore, theme development requires interpretation, reflection, and researcher judgment rather than simple labeling or counting of repeated words. In this sense, thematic analysis allows qualitative findings to move beyond descriptive summaries toward a deeper understanding of users' experiences and contextual problems.

In knowledge management research, thematic analysis is useful because organizational knowledge is often embedded in everyday practices, informal communication, and individual experience. While explicit knowledge may be stored in documents, manuals, or digital systems, tacit knowledge is more difficult to capture and often depends on the experiences of staff members or users. Through interviews, focus groups, and open-ended responses, thematic analysis can help reveal knowledge-related issues such as fragmented information, unclear procedures, limited access to updated knowledge, reliance on individual staff members, or the absence of systematic knowledge-sharing practices. These insights can inform the improvement of knowledge management processes and the development of more accessible digital platforms.

Thematic analysis is also relevant to design thinking because it supports the empathize and define stages of the design process. Data collected from users can be coded and analyzed to identify recurring pain points, unmet needs, and expectations. These themes can then be used to define the core problem and guide the development of ideas, prototypes, and solutions that are grounded in users' actual experiences. In the context of digital platform development, thematic analysis can reveal issues such as confusion about procedures, difficulty accessing information, uncertainty about required documents, and the need for step-by-step guidance. Overall, thematic analysis provides an appropriate analytical tool for translating qualitative data into practical insights that support user-centered innovation, knowledge management, and service improvement.

3. Customer Journey Mapping

Customer Journey Mapping (CJM) is a strategic tool for understanding user experiences across different stages of interaction with a service, system, or organization. Lemon and Verhoef (2016) explain that the customer journey covers the sequence of experiences that users encounter before, during, and after service interaction. By mapping these experiences, researchers can identify key touchpoints, user expectations, emotional responses, and pain points throughout the process. This holistic perspective enables organizations to better understand how users engage with services and where service gaps or difficulties may occur.

Within the Design Thinking framework, CJM is particularly relevant to the Empathize and Define stages because it helps researchers explore users' lived experiences and clarify problem areas. Rosenbaum et al. (2017) emphasize that customer experiences are not only functional but also emotional, suggesting that service design should consider how users feel at different stages of interaction. CJM therefore allows researchers to capture both cognitive and affective dimensions of user experience. This makes it useful for identifying moments of confusion, delay, frustration, or unmet expectations, especially in services involving multiple procedures, actors, or information sources.

CJM is often organized around journey stages that represent users' progression through a service process. These stages may include initial awareness, information seeking, decision-making, service use, and follow-up interaction. However, user journeys are not always linear, particularly in digital and administrative contexts where users may move back and forth between different sources of information, offices, and online channels. This non-linear nature highlights the need for service systems that are flexible, accessible, and responsive to diverse user needs.

In public service and digital platform development, CJM has been used to reveal hidden service problems and support user-centered improvement. Ludwiczak (2021) suggests that CJM helps service providers shift attention from internal organizational procedures to users' actual experiences, including their expectations, difficulties, and emotional reactions. This is especially relevant in contexts characterized by procedural complexity, fragmented information, or multiple responsible units. By identifying critical touchpoints and pain points, CJM can provide a clear basis for defining problems and generating design solutions.

CJM provides a practical method for translating user experiences into design insights. Its integration with Design Thinking strengthens empathy, supports problem definition, and guides the development of solutions that respond to real user needs. In educational and administrative contexts, such as visa-related services for international students, CJM can help clarify where users encounter difficulties and support the development of more accessible, coherent, and user-centered digital platforms.

4. SECI model

Knowledge Management (KM) refers to the systematic process of creating, sharing, organizing, and applying knowledge to support learning, decision-making, and organizational improvement. In contexts where information is fragmented, difficult to access, or dependent on individual experience, KM helps transform scattered information into structured and usable knowledge. Nonaka and Takeuchi (1995) propose the SECI model as a key framework for understanding knowledge creation through the interaction between tacit knowledge and explicit knowledge. Tacit knowledge refers to personal, experience-based knowledge that is difficult to formalize, while explicit knowledge refers to knowledge that can be documented, organized, and shared through formal systems.

The SECI model consists of four knowledge conversion processes: Socialization, Externalization, Combination, and Internalization. Socialization involves the sharing of tacit knowledge through direct interaction, observation, and experience. Externalization refers to the process of articulating tacit knowledge into explicit forms such as written guidelines, concepts, or models. Combination involves integrating different sources of explicit knowledge into more organized structures, such as documents, databases, or digital platforms. Internalization occurs when individuals apply explicit knowledge in practice and transform it into personal understanding or skills. Together, these processes form a continuous cycle of knowledge creation and organizational learning.

The SECI model is particularly relevant to studies that involve Design Thinking and digital platform development. Both SECI and Design Thinking emphasize iterative learning, user engagement, and the transformation of experience into practical knowledge. In the Empathize stage, tacit knowledge can be captured through interviews, observations, and user feedback, which corresponds to Socialization. In the Define and Ideate stages, users' experiences and problems are articulated into clearer problem statements and solution concepts, reflecting Externalization. During the Prototype stage, different forms of explicit knowledge can be integrated into a structured digital platform, corresponding to Combination. Finally, in the Test stage, users interact with the prototype and develop new understanding through practice, which reflects Internalization.

In the context of developing a visa information support platform for international students, the SECI model provides a useful framework for transforming fragmented and experience-based knowledge into accessible and user-centered information. Visa-related knowledge often exists in different forms, including formal regulations, institutional documents, staff experience, and students' practical questions. By integrating KM with Design

Thinking, this knowledge can be captured, organized, and translated into a more structured digital platform that supports students' understanding, reduces confusion, and improves the overall administrative experience.

5. Digital Platform for Information Services

Digital platforms for information services have become important tools for organizations that manage complex procedures, dynamic information, and diverse user needs. Laudon and Laudon (2020) explain that information systems support the collection, storage, processing, and dissemination of information, while also improving decision-making, operational efficiency, and user experience. In contexts where users must navigate multi-step administrative or regulatory processes, digital platforms can reduce uncertainty by providing timely, accurate, and structured information.

Digital knowledge platforms further extend the role of information systems by integrating knowledge management principles with digital technologies. Alavi and Leidner (2001) emphasize that knowledge management systems support the creation, storage, transfer, and application of knowledge within organizations. In practice, digital platforms can transform fragmented information into accessible and actionable knowledge through centralized interfaces, organized content, search functions, and step-by-step guidance. This is particularly useful in service environments where users need to understand procedures, prepare documents, and follow updated requirements.

From a service innovation perspective, digital platforms also improve the way organizations deliver services and create value for users. Vargo and Lusch (2008) argue that service value is co-created through interaction between providers and users. In this sense, digital platforms can shift service delivery from one-way information provision to more interactive and user-centered support. Users are not only recipients of information but can also engage with the system, access relevant guidance, and provide feedback for continuous improvement.

The integration of digital platforms with Design Thinking and Knowledge Management strengthens their potential as user-centered solutions. Design Thinking helps ensure that platform development is grounded in users' real needs and experiences, while the SECI model supports the transformation of tacit and explicit knowledge into structured and usable information. In systems involving complex procedural information, such as visa processes, digital platforms can simplify information structures, visualize service steps, and provide clearer guidance to reduce cognitive burden and procedural errors.

In this study, the proposed digital platform for visa information services is positioned as a practical application of information systems, knowledge management, and service innovation. By transforming fragmented visa-related information into a centralized and user-centered platform, the system aims to improve information accessibility, support knowledge sharing, and enhance the administrative experience of international students. Therefore, digital platforms are not merely technological tools, but strategic mechanisms for improving service quality and supporting internationalization in educational institutions.

Research objectives

1. To identify and analyze key factors and challenges related to visa processes and visa information experienced by international students, including gaps in knowledge accessibility and understanding.

2. To design and develop a prototype digital platform as a practical solution to improve students' experiences and support more effective visa-related operations.

3. To implement and validate the effectiveness of the proposed digital platform using the Design Thinking approach as a knowledge management (KM) tool for enhancing students' understanding and engagement.

Research Questions

1. How can a digital platform be effectively implemented and validated to enhance international students' understanding and perception of visa information and processes?

2. What are the key challenges and barriers faced by international students in accessing and understanding visa-related information?

3. What features and design elements are required for a user-centered digital platform to effectively support visa processes?

Research Methodology

This study employed a qualitative research design guided by the Design Thinking framework to explore international students' experiences, challenges, misunderstandings, and knowledge gaps related to visa processes at the Faculty of Humanities, Chiang Mai University. A qualitative approach was considered appropriate because visa-related experiences involve uncertainty, procedural complexity, emotional responses, and context-specific challenges that cannot be fully captured through numerical data alone. Design Thinking was used as the main methodological framework because of its human-centered and iterative nature, enabling the study to move from understanding users' experiences to developing and evaluating a conceptual digital platform for visa information services.

Although this study adopts a qualitative research approach, the questionnaire was used as supplementary evidence to support, extend, and triangulate the qualitative findings obtained from interviews and focus group discussions. The main purpose of the questionnaire was not to test hypotheses, examine causal relationships, or make statistical generalizations. But it was used to examine whether the issues emerging from the qualitative data were also commonly experienced by a wider group of international students. This triangulation of data sources helped strengthen the findings by comparing recurring patterns across interviews, focus group discussions, and questionnaire responses. The frequency results therefore served as supporting evidence for validating the relevance of the qualitative themes, improving the accuracy of interpretation, and reducing potential bias from reliance on a single data source.

Research Process

The research process followed five stages of Design Thinking: Empathize, Define, Ideate, Prototype, and Test.

In the Empathize stage, data were collected through semi-structured interviews, focus group discussions, questionnaires, and Customer Journey Mapping (CJM). These methods were used to understand students' visa-related experiences across application, conversion, extension, and termination processes. CJM helped identify key touchpoints, emotional responses, and pain points throughout the visa journey.

In the Define stage, the collected qualitative data were analyzed using thematic analysis. Interview and focus group data were repeatedly reviewed, coded, categorized, and developed into themes that reflected major problem areas and user needs. Questionnaire data were used as supporting evidence to identify broader patterns and validate recurring issues.

The Ideate and Prototype stages focused on translating the feature mapping and the research findings into a conceptual digital platform. Key themes and pain points identified from the earlier stages were transformed into platform requirements and service design elements,

including step-by-step visa guidance, frequently asked questions, timeline visualization, reminders, and organized visa-related knowledge. The SECI model was applied as a supporting knowledge management framework to explain how tacit knowledge from students and staff members experiences was externalized, organized, and transformed into explicit knowledge for platform development. In this context, the SECI model was used as knowledge management lens for explaining how tacit and explicit knowledge were transformed into a practical digital platform.

In the Test stage, participants interacted with the conceptual prototype and provided feedback on its usability, clarity, relevance, and usefulness. A usability evaluation form using a five-point Likert scale was used together with open-ended feedback to assess key dimensions such as clarity of information, ease of use, navigation, procedural understanding, visual organization, support effectiveness, and overall satisfaction. Qualitative feedback was analyzed thematically to identify areas for further improvement and to refine the proposed platform concept.

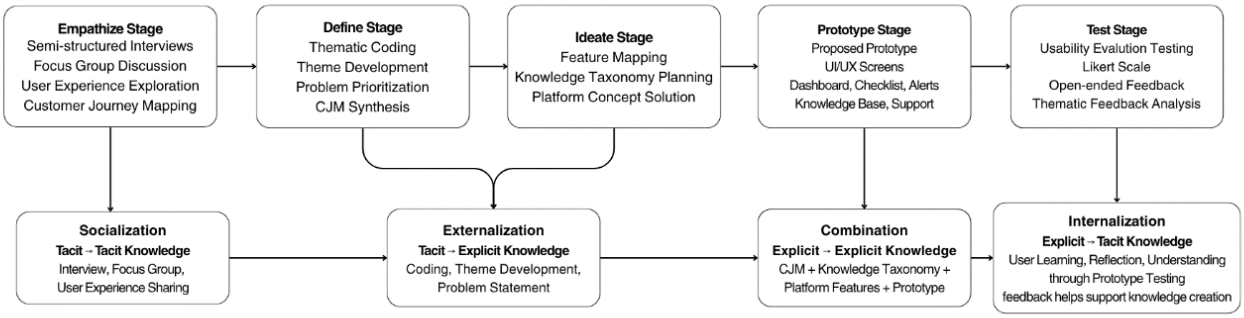


Figure 1 Research Process Diagram

Participants

Participants were selected using purposive sampling based on their direct experience with visa-related processes. The study included international students from different academic levels and program types, including students from the Bachelor of Arts Program in Humanities and Sustainability (BAHS), the Bachelor of Arts in Thai as a Foreign Language (TFL), exchange students, and visiting scholars. Four knowledge workers responsible for international affairs and visa-related services were also included to provide institutional and procedural perspectives. The amount of 24 international students took part in interviews and focus group discussions, while 48 international students participated in the questionnaire. The inclusion of both student and staff perspectives allowed the study to develop a more comprehensive understanding of visa-related challenges and ensured that the proposed platform was grounded in real user needs and institutional practices.

Results and Findings

The findings of the study are presented and discussed based on the research process guided by the Design Thinking framework. The chapter covers the results obtained from each stage of the study, including Empathize, Define, Ideate, Prototype, and Test. Multiple methods were used throughout the research process, including questionnaires, semi-structured interviews, focus group discussions, Customer Journey Mapping (CJM), thematic analysis, and usability evaluation. The findings from both international students and knowledge workers are analyzed in order to better understand visa-related experiences, challenges, and support needs within the university context.

Empathize Stage

The Empathize stage represents the initial phase of the Design Thinking process, aiming to gain a comprehensive understanding of international students' experiences, perceptions, and challenges related to visa processes. In this study, data were collected through semi-structured interviews, focus group discussions, and questionnaires administered to international students at the Faculty of Humanities, Chiang Mai University.

Questionnaire Analysis and Validation of Empathize Stage Findings

In this study, the questionnaire played an important role in strengthening the Empathize stage by confirming whether the issues identified from in-depth narratives were also commonly experienced by a wider group of international students. Thus, the questionnaire findings were analyzed using frequency analysis, focusing on how often particular problems occurred among respondents. This approach is appropriate because the main purpose of the Empathize stage is to understand users' experiences and recognize recurrent problem patterns rather than to test hypotheses or measure causal relationships.

Table 1 Frequency of Visa-Related Problems Reported by International Students (n = 48)

Problem Area	Frequency (f)	Percentage (%)
Difficulty finding clear and reliable visa information	39	81.3
Confusion about required documents	37	77.1
Uncertainty about visa procedures and sequence of steps	35	72.9
Stress or anxiety related to visa deadlines	33	68.8
Difficulty understanding official instructions/forms	31	64.6
Receiving inconsistent information from different sources	30	62.5
Having to rely on friends or senior students for guidance	29	60.4
Having to contact or visit multiple offices for one process	27	56.3
Fear of making mistakes that may affect visa status	27	56.3
Lack of reminders or follow-up support from the system	24	50.0

From the Table 1, it represents the frequency distribution of the key difficulties reported by 48 respondents during their visa journey. The frequency results indicate that the most common problem experienced by respondents was difficulty finding clear and reliable visa information (81.3%), followed by confusion about required documents (77.1%) and uncertainty about visa procedures and sequence of steps (72.9%). These findings suggest that the most pressing issues encountered by international students are related to information clarity, procedural understanding, and access to trustworthy guidance. In addition, a considerable proportion of respondents reported stress or anxiety related to visa deadlines (68.8%), difficulty understanding official instructions and forms (64.6%), and receiving inconsistent information from different sources (62.5%). These findings demonstrate that the visa process is not only informationally complex but also emotionally demanding. The results further show that many students relied on informal support systems, such as friends or senior students (60.4%), and more than half of the respondents had to interact with multiple offices to complete a single process (56.3%). This indicates that students' visa journeys are shaped not only by the formal administrative system but also by unofficial peer networks and fragmented institutional coordination.

Interpretation of Questionnaire Findings in Relation to Thematic Analysis

The questionnaire results were used to validate the themes emerging from the qualitative analysis. Overall, the frequency findings strongly support the four major themes identified in the Empathize stage, namely Information Fragmentation, Procedural Uncertainty, Psychological Burden, and Administrative Complexity.

First, the theme of Information Fragmentation was strongly confirmed by the questionnaire findings. More than four-fifths of respondents (81.3%) reported difficulty finding clear and reliable visa information, while 62.5% indicated that they had received inconsistent information from different sources. In addition, 60.4% of respondents stated that they relied on friends or senior students for guidance. These frequency patterns are consistent with the interview data, in which participants repeatedly described the experience of searching for visa information across multiple channels and struggling to determine which source was trustworthy. In other words, the questionnaire demonstrates that this issue is not limited to a few individuals but is a widespread concern among international students.

Second, the theme of Procedural Uncertainty was also strongly reinforced. The questionnaire revealed that 77.1% of respondents were confused about required documents and 72.9% were uncertain about the visa procedure and sequence of steps. Furthermore, 64.6% experienced difficulty understanding official instructions and forms. These results align closely with the qualitative findings, where participants expressed uncertainty about document preparation, order of actions, and procedural expectations. The questionnaire therefore confirms that procedural confusion is one of the most common barriers encountered by students during the visa process.

Third, the theme of Psychological Burden emerged clearly in both qualitative and questionnaire findings. The frequency analysis showed that 68.8% of respondents experienced stress or anxiety related to visa deadlines, and 56.3% feared making mistakes that might affect their visa status. These findings support the interview narratives in which students described the visa process as stressful, high-risk, and emotionally draining. The questionnaire helps demonstrate that emotional strain is not merely an individual reaction but a recurring feature of the visa experience.

Finally, the theme of Administrative Complexity was also reflected in the questionnaire data. More than half of respondents (56.3%) indicated that they needed to contact or visit multiple offices for a single visa-related process. In addition, 50.0% reported a lack of reminders or systematic follow-up support. These patterns reinforce the qualitative accounts of fragmented coordination and procedural inefficiency. They also suggest that students' experiences are shaped by structural issues in service delivery rather than by isolated incidents.

Interview and Focus Group Data in Relation to Thematic Analysis

The qualitative data obtained from semi-structured interviews and focus group discussions were analyzed using thematic analysis following a systematic coding and categorization process. The analysis aimed to identify recurring patterns in participants' experiences and to interpret the underlying meanings associated with visa-related challenges.

Importantly, this study incorporates perspectives from both international students and knowledge workers responsible for visa-related services, allowing for a more comprehensive understanding of the visa process from both user and institutional perspectives. While students provided experiential insights into difficulties and emotional responses, knowledge workers contributed explanations related to administrative procedures, policy constraints, and operational limitations.

Through iterative coding and theme development, four dominant themes emerged: Information Fragmentation, Procedural Uncertainty, Psychological Burden, and Administrative Complexity. These themes reflect not only user-side challenges but also underlying system-level conditions that shape the overall visa experience.

Theme 1: Information Fragmentation

The theme of information fragmentation emerged as one of the most prominent and recurring issues across participants. Students reported that visa-related information was distributed across multiple platforms and sources, making it difficult to access, interpret, and trust. Participants frequently described the process of searching for information as time-consuming and confusing:

"Different websites provide different information, and I don't know which one is correct."

"There is information everywhere, but it is not organized, so I still feel confused."

"I feel like I have information, but I cannot use it because it is too scattered."

"Even when I find the information, it is difficult to understand."

These responses indicate that students face significant challenges in identifying reliable sources and synthesizing information into a coherent understanding of the visa process. From the perspective of knowledge workers, this issue was explained as a result of structural and operational constraints in information management:

"Visa information is provided through different channels, such as public announcements, university systems, and immigration updates."

"There is currently no centralized system that integrates all visa-related information for students."

From the result of interview and focus group discussion, the integration of these perspectives suggests that information fragmentation is not merely a user-side perception but reflects a broader knowledge management challenge, particularly in the Combination phase of the SECI model, where explicit knowledge is not effectively integrated into a unified system. Within the Customer Journey, this issue is most critical during the Information Search stage, where students attempt to build an initial understanding of visa requirements. The lack of structured and centralized information at this stage creates confusion that extends into later stages of the process.

Theme 2: Procedural Uncertainty

Procedural uncertainty represents another major theme, characterized by students' lack of clarity regarding visa processes, document requirements, and sequential steps. Participants expressed confusion about what actions to take and how to proceed:

"I don't know which documents I need, and I'm afraid I might prepare the wrong ones."

"There is no clear step-by-step explanation, so I just follow what others tell me."

"The process is not explained clearly, so I feel uncertain all the time."

"The forms are difficult to understand, and I don't know how to fill them properly."

These statements suggest that students struggle to translate available information into actionable steps, resulting in trial-and-error behavior and increased risk of mistakes. Also, knowledge workers provided additional insights into the causes of this uncertainty:

"The visa process is not always linear, as it depends on each student's situation."

"Different visa cases may require different documents, which makes it difficult to provide a single standard guideline."

These findings indicate that procedural uncertainty arises from both system complexity and lack of user-oriented communication design. The absence of simplified, step-by-step guidance contributes to misunderstandings and inefficiencies. Within the Customer Journey, this issue is most evident during the Document Preparation and Application stages, where students are required to actively engage with administrative procedures.

Theme 3: Psychological Burden

A significant finding from the analysis is the emotional dimension of the visa process. Participants consistently described feelings of stress, anxiety, and fear, indicating that visa-related tasks are perceived as high-stakes and psychologically demanding.

Participants shared the following experiences:

"I am worried because my visa will expire in the next two days."

"I feel very stressed because if I make a mistake, it can affect my visa."

"The visa process makes me nervous because it is very important for my stay."

"I'm afraid of doing something wrong because I don't fully understand the process."

These responses indicate that the visa process is perceived as a high-risk activity, where errors may have serious consequences, including legal and academic implications. Knowledge workers acknowledged this issue and provided contextual explanations:

"If students miss deadlines, it can lead to penalties or complications."

"We try to support students, but we cannot always monitor each case individually."

These findings suggest that psychological burden is not only an individual emotional response but also a result of system characteristics, including time sensitivity, procedural complexity, and limited support mechanisms. Within the Customer Journey, emotional intensity is particularly high during the Application and Extension stages, where deadlines and compliance requirements are most critical.

Theme 4: Administrative Complexity

The final theme relates to administrative complexity, particularly the need to interact with multiple offices and navigate fragmented institutional processes. Participants described the system as inefficient and difficult to manage:

"Sometimes I need to go back and forth between offices."

"Each office gives different instructions, and it is confusing."

"The process takes a long time because there are many procedures."

"It is difficult because I don't know who is responsible for each step."

These responses indicate that students often act as intermediaries between different administrative units, which increases effort and uncertainty. From the knowledge worker perspective, this complexity was explained as a structural characteristic of the system:

"Each office is responsible for a specific part of the visa process."

"There is no fully integrated system connecting all departments."

This suggests that administrative complexity is not due to inefficiency at the individual level, but rather reflects organizational structure and lack of system integration.

Within the Customer Journey, this issue is most prominent during the Application and Follow-up stages, where coordination between multiple actors is required.

Customer Journey Mapping (CJM) Analysis

Based on the findings from questionnaire analysis and thematic analysis, a Customer Journey Map (CJM) was developed to systematically illustrate international students' experiences across different stages of visa processes. The mapping integrates both user experiences (students) and system-level explanations (knowledge workers) in order to provide a holistic understanding of the visa journey. In this study, the visa journey is structured based on the four key processes identified in Chapter 1, namely Application, Conversion, Extension, and Termination processes, which together represent the complete visa lifecycle experienced by international students. The Customer Journey Mapping focuses on four key elements, including stages of the journey, touchpoints (interactions with systems or staff), emotional responses, pain points (linked with thematic analysis), as shown in the table 2.

Table 2 Customer Journey Mapping of Visa Processes

Journey Stage	Key Activities	Touchpoints	Emotional Response	Pain Points (Themes)	System Explanation (Knowledge Workers)
1. Information Search (Application Stage)	- Search visa info - Understand requirements	- University website - Faculty announcements - social media -Friends/seniors	Confusion, uncertainty	Information Fragmentation	Information is distributed across multiple platforms; updates not synchronized
2. Document Preparation (Application / Conversion)	- Prepare documents - Check requirements	- Faculty staff - Online guidelines - Immigration forms	Anxiety, lack of confidence	Procedural Uncertainty	Requirements vary by case; no standardized step-by-step system
3. Process Execution (Application / Conversion / Extension)	- Submit documents - Visit offices - Contact multiple units	- Faculty office - Immigration office - External agencies	Stress, frustration	Administrative Complexity	Responsibilities divided across units; no integrated system
4. Monitoring & Follow-up (Extension)	- Track visa expiry - Prepare extension - 90-day reporting	- Immigration system - Faculty reminders (limited)	Anxiety, pressure	Psychological Burden	No automated reminder system; students must self-monitor
5. Transition / Exit (Termination)	- End visa status - Prepare exit or change visa	- Faculty office - Immigration office	Uncertainty, confusion	Procedural Uncertainty + Information Fragmentation	Limited communication on termination process; unclear guidance

The Customer Journey Mapping reveals that international students' visa experiences are not isolated events but occur as a continuous process characterized by evolving challenges at each stage. At the Information Search stage, students experience high levels of confusion

due to fragmented and inconsistent information. This aligns strongly with the theme of Information Fragmentation, where multiple sources provide uncoordinated and sometimes outdated information. Knowledge workers confirm that this issue stems from decentralized information systems and frequent policy updates. During the Document Preparation stage, the primary challenge shifts to Procedural Uncertainty, as students struggle to understand document requirements and process steps. The absence of clear and standardized guidance leads to reliance on informal sources and trial-and-error behavior. At the Process Execution stage, students encounter Administrative Complexity, particularly in the need to interact with multiple offices and navigate fragmented institutional structures. This stage is characterized by inefficiency and lack of coordination between units, as confirmed by knowledge workers. In the Monitoring and Follow-up stage, emotional responses become more prominent, with students experiencing stress and anxiety related to deadlines and compliance requirements. This reflects the theme of Psychological Burden, which is intensified by the lack of reminder systems and continuous support. Finally, in the Termination stage, students face renewed uncertainty due to limited understanding of final procedures and lack of clear communication, combining issues of both information fragmentation and procedural uncertainty.

Define Stage

The Define stage emphasizes the interpretation and synthesis of those experiences into meaningful and structured insights. In this study, the Define stage is developed based on the findings obtained from questionnaire analysis, thematic analysis, and Customer Journey Mapping (CJM) presented in the previous section. These findings provide a comprehensive understanding of both the patterns and underlying causes of visa-related challenges experienced by international students. Rather than treating each finding separately, the researcher integrates these insights in order to identify broader problem areas that reflect recurring and significant issues throughout the visa journey. This process is important because it allows the researcher to move beyond descriptive understanding and toward a more focused and analytical perspective on the problem. From the perspective of knowledge management, this stage can be understood as corresponding to the Externalization process of the SECI model, where tacit knowledge derived from users' experiences is gradually transformed into explicit knowledge in the form of themes, categories, and clearly defined problem statements. This transformation plays a crucial role in bridging the gap between user experience and solution development.

Synthesis of Key Themes into Problem Domains

Based on the thematic analysis, four major themes were identified, including Information Fragmentation, Procedural Uncertainty, Psychological Burden, and Administrative Complexity. In the Define stage, these themes are further interpreted and synthesized into broader problem domains in order to provide a clearer understanding of the underlying issues.

The first theme, Information Fragmentation, can be understood as a problem related to the lack of a centralized and reliable information system. The findings indicate that students often need to search for visa-related information from multiple sources, such as university websites, social media platforms, and peer networks. As a result, the information they receive is often inconsistent, incomplete, or outdated. This situation makes it difficult for students to determine which information is correct and applicable to their case.

The second theme, Procedural Uncertainty, reflects the difficulty students face in understanding visa procedures and document requirements. The findings suggest that students are not only unsure about what documents are required but also about how to complete

the process step by step. In many cases, students rely on informal guidance from peers rather than official instructions, which may increase the risk of misunderstanding and errors. This indicates that existing procedural guidance lacks clarity and is not sufficiently user-oriented.

The third theme, Psychological Burden, highlights the emotional dimension of the visa process. Students frequently describe feelings of stress, anxiety, and fear, particularly in relation to deadlines and the possibility of making mistakes. This suggests that visa-related procedures are perceived as high-risk activities, where the consequences of errors may be significant. Therefore, the problem is not only procedural but also psychological, as students must manage both cognitive and emotional challenges simultaneously.

The fourth theme, the theme of Administrative Complexity reflects the structural characteristics of the visa system. The findings show that students are required to interact with multiple offices and navigate fragmented administrative processes. In many cases, students need to coordinate information and actions across different units by themselves, which increases both time and effort. This indicates that the issue is not only related to individual understanding but also to the lack of integration within the system.

Problem Statements

Based on the synthesis and prioritization of findings, the researcher formulated a set of problem statements to guide the next phase of the study. These problem statements were developed to reflect the actual needs and difficulties expressed by users, while also remaining broad enough to support solution development in the Ideate stage.

The first problem statement is that international students experience difficulty accessing clear, reliable, and organized visa-related information because existing information sources are fragmented and not integrated into a centralized system.

The second problem statement is that international students face uncertainty when navigating visa procedures because the process is not presented in a clear, step-by-step, and user-friendly manner.

The third problem statement is that international students experience stress and anxiety throughout the visa process because they must manage important deadlines, compliance requirements, and procedural risks without sufficient support mechanisms.

The fourth problem statement is that international students encounter unnecessary difficulty in completing visa-related processes because institutional responsibilities are fragmented and the support system lacks clear coordination from the user's perspective.

Ideate Stage

After identifying the key problem areas in the Define stage, the next step in the Design Thinking process involves exploring possible ways to address those challenges. In this stage, the focus is no longer on narrowing down the problem, but rather on opening up different possibilities and considering how the identified issues can be approached from a design perspective. In this study, the ideation process does not begin from abstract creativity, but instead builds directly on the findings from the previous stages. The issues related to fragmented information, unclear procedures, emotional pressure, and administrative complexity are used as starting points for generating potential solutions. This approach ensures that the ideas developed in this stage remain grounded in the actual experiences of international students and knowledge workers rather than being disconnected from the research context.

Idea Development Based on Identified Problems

Instead of generating ideas in a broad or unstructured manner, the researcher approaches the ideation process by systematically connecting each identified problem domain with potential design responses. This approach allows the development of solutions to remain closely grounded in the empirical findings obtained from the Empathize and Define stages. In other words, the ideas are not created based on assumptions or general expectations, but are derived directly from the actual difficulties and needs expressed by users.

By establishing a clear relationship between problem domains and solution directions, the ideation process becomes more focused and purposeful. Each proposed feature or concept can be traced back to a specific issue identified in the earlier stages, such as fragmented information, unclear procedures, or the need for better support in managing deadlines. This traceability is important because it ensures that the design decisions are supported by evidence rather than intuition alone.

Furthermore, linking problems to solutions in a systematic way also supports the transition to the Prototype stage, as it provides a clear rationale for why certain features are included in the design. This makes the overall development process more coherent, as each stage of Design Thinking can be logically connected and clearly explained within the research framework.

Relationship with the Customer Journey Mapping

The ideas proposed in this stage are closely linked to the Customer Journey Mapping developed earlier. Each solution direction corresponds to a specific stage where users experience difficulties. For example, improving information structure directly addresses challenges in the early stage of the journey, while procedural guidance supports users during document preparation. Features related to reminders and tracking become more relevant in later stages, where time pressure increases. This connection ensures that the proposed solutions are not general or abstract, but are directly related to the actual experiences identified in the research. At this point, the ideation process results in a set of structured solution directions that can be further developed in the next stage. Rather than final solutions, these ideas serve as a foundation for designing and testing a prototype. Thus, a feature mapping process was conducted to translate users' needs and pain points into potential solution features. This process served as a bridge between problem identification and prototype development by systematically linking user challenges to specific platform functionalities. Rather than generating isolated ideas, feature mapping helped ensure that each proposed feature directly addressed one or more issues identified throughout the visa journey.

Table 3 Feature Mapping from Problem Domains to Proposed Platform Features

Problem Domain	User Need	Design Opportunity	Proposed Feature
Information Fragmentation	Centralized access to information	Consolidate information into a single platform	Dashboard Overview
Procedural Uncertainty	Clear process guidance	Visualize visa procedures step-by-step	Visa Journey
Procedural Uncertainty	Document preparation support	Simplify document preparation	Document Checklist
Psychological Burden	Deadline monitoring	Reduce anxiety through proactive reminders	Alerts and Reminders

Problem Domain	User Need	Design Opportunity	Proposed Feature
Administrative Complexity	Access to support services	Improve navigation of support channels	Support Services
Information Fragmentation	Searchable knowledge repository	Organize visa knowledge systematically	Knowledge Base Taxonomy

Prototype Stage

In this stage, the prototype was developed in the form of a conceptual digital platform interface designed to mainly support international students in managing visa-related processes. The development of the prototype was guided directly by the findings from the previous stages, particularly in relation to issues of information fragmentation, procedural uncertainty, psychological burden, and administrative complexity. Rather than presenting abstract ideas, the prototype aims to demonstrate how these challenges can be addressed through a structured and user-centered design.

To visualize the proposed solution, a high-fidelity prototype was developed using Figma, a collaborative interface design and prototyping tool. Rather than building a fully functional application, Figma enabled the researcher to identify needed key features and translate the proposed platform into an interactive prototype that closely represents the intended user experience. This approach allowed participants to navigate the interface, explore key functions, and provide meaningful feedback during the evaluation process while remaining within the scope of the study.

The prototype was developed as a web-based platform interface, consisting of several interconnected screens that represent key functions of the system. These screens include a dashboard overview, visa journey guidance, document checklist, alerts and reminders, knowledge base, and support section. Each screen was designed with specific user needs in mind, ensuring that the overall structure of the platform remains aligned with the findings. In order to demonstrate how users interact with the system, the prototype incorporates a simulated user interface, as illustrated by the dashboard screen displaying a sample user. This design choice does not imply the development of an actual authentication system, but rather serves to illustrate how personalized features may function within the platform. By presenting user-specific information such as visa status, current stage, and upcoming deadlines, the interface helps communicate how the system can support users in managing their visa-related tasks more effectively.

Dashboard Overview

The dashboard serves as the primary entry point of the proposed platform, providing users with an integrated overview of their current visa status, ongoing processes, and upcoming tasks. As illustrated in the prototype interface, this page is designed to function as a central hub where key information is presented in a clear, structured, and easily interpretable format. Rather than requiring users to navigate across multiple sections to understand their situation, the dashboard consolidates relevant data into a single view, allowing users to quickly grasp where they are in the visa process and what actions are required next.

At this stage, students are able to view essential information such as their visa type, current process stage, and visa expiry date. In addition, the dashboard highlights immediate priorities through sections such as “Next Steps,” “Document Status,” and “Upcoming Deadlines.” These components are intentionally organized to guide users’ attention toward actionable tasks, helping them identify what needs to be completed, what has already been prepared, and what remains pending.

The dashboard directly addresses the issue of information fragmentation by integrating previously scattered information into a centralized interface. At the same time, it contributes to reducing psychological burden by providing clarity, structure, and a sense of control over the process. By enabling users to monitor their progress and anticipate upcoming requirements, the dashboard helps transform what is often perceived as a complex and stressful process into a more manageable and transparent experience.

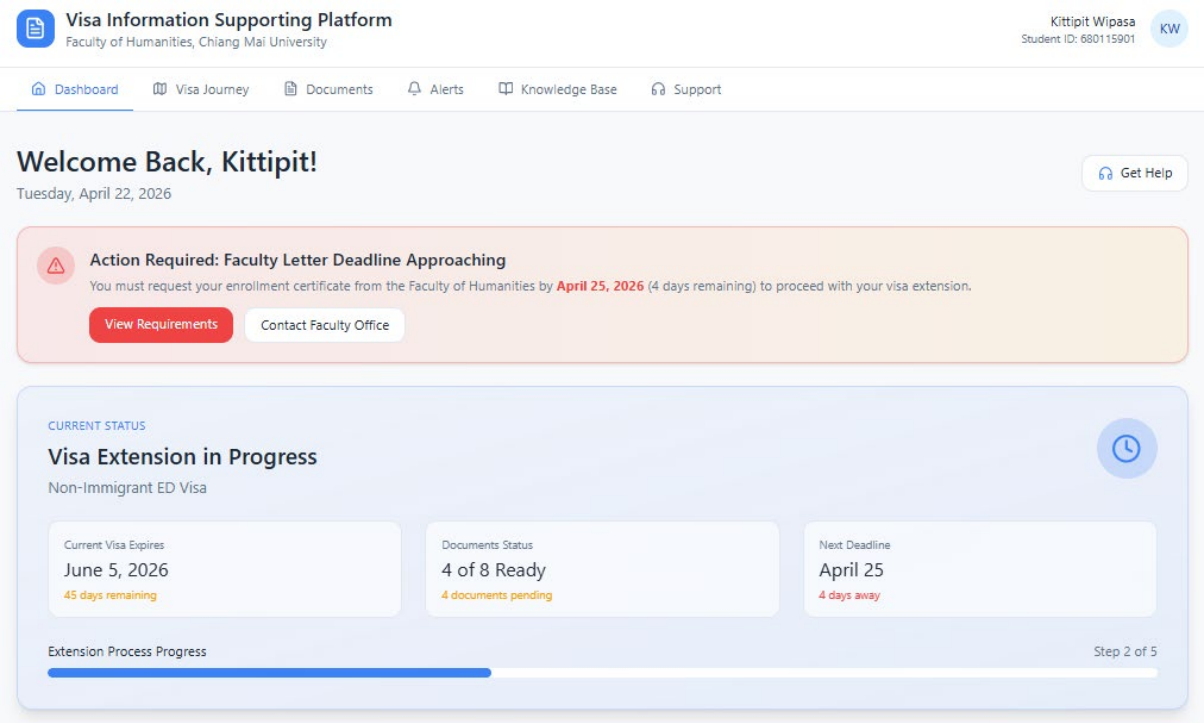


Figure 2 Prototype Dashboard of the Visa Information Support Platform

Step-by-Step Visa Journey Page

One of the central features of the prototype is the Visa Journey Step-by-Step Guidance System, which presents visa-related processes in a structured, sequential, and user-friendly manner. The journey is divided into four main stages: application, conversion, extension, and termination. These stages represent the overall lifecycle of visa-related processes that international students commonly experience throughout their period of study in Thailand.

Each stage contains a clear explanation of required actions, related procedures, required documents, timelines, and expected process flow. Instead of presenting information in a fragmented or text-heavy format, the platform organizes the process into manageable steps, allowing users to understand not only what needs to be completed, but also how different parts of the process are connected to one another. The interface also allows users to navigate into more detailed sub-sections within each stage, providing a clearer breakdown of visa-related procedures in a step-by-step format. This design helps users better understand the sequence of actions required at each stage and prepares them more effectively for document submission and administrative procedures.

This visa journey feature is particularly important in addressing the issue of procedural uncertainty, which emerged as one of the major themes in the Empathize and Define stages. By improving process clarity and helping users anticipate upcoming requirements, the

platform may support students in managing visa-related tasks with greater confidence, preparedness, and reduced psychological burden throughout the process.

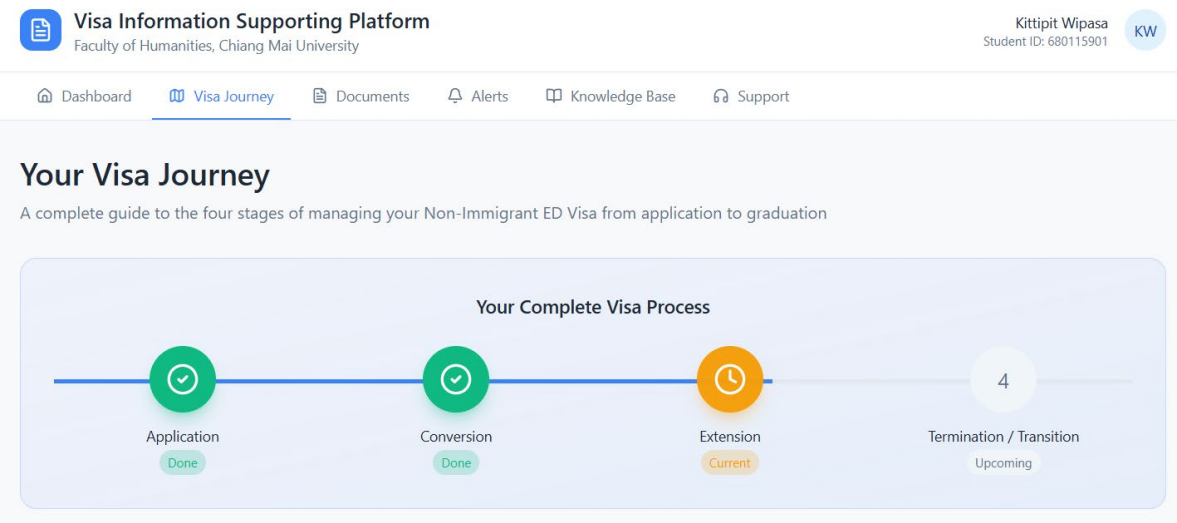


Figure 3 an Example of Visa Journey for International Students

Document Checklist

The document checklist feature was designed to help users prepare and organize required documents more clearly throughout the visa process. The system provides a list of required documents together with status indicators showing whether each item is completed, pending, or still missing. This allows users to monitor their progress more easily before submitting documents to the university or Immigration Bureau. The checklist is separated according to different visa-related processes, including initial application, visa conversion, visa extension, and visa termination. Users can select their current process and view document requirements specifically related to that stage. The interface also includes a progress bar and completion summary so users can quickly see how many documents are already prepared and what still needs attention.

The checklist also includes upload and tracking functions so users can monitor which documents are already prepared and which items still require action. This feature also demonstrates how pending documents are highlighted together with submission reminders and preparation timelines. This helps users prioritize important tasks and avoid missing deadlines or submitting incomplete documents.

To summarize, the document checklist feature mainly addresses the issues of procedural uncertainty and administrative complexity identified in the earlier stages of the research.
By making document requirements more visible, structured, and easier to track, the platform may help users feel more prepared and confident when managing visa-related procedures.

Alerts and Reminder System

An alerts and reminder system designed to help users manage important visa-related deadlines and time-sensitive tasks more effectively. This feature was developed based on findings from the Empathize stage, where many participants mentioned that they often felt stressed or worried about forgetting deadlines, preparing documents too late, or missing important immigration requirements. The alerts and reminder page provides users with an overview of active reminders, upcoming tasks, and completed activities. Instead of requiring

users to check multiple pages or remember every requirement by themselves, the system gathers important information into one place so users can quickly understand what still needs attention and what has already been completed.

By combining reminders, task guidance, timelines, and progress monitoring into one interface, the platform helps users better prepare for deadlines and reduce the risk of missing important requirements. Compared to the identified themes, the alerts and reminder system mainly responds to the issue of psychological burden identified in the earlier stages of the research. At the same time, the feature also supports better time management and procedural understanding by helping users keep track of important responsibilities throughout their visa journey.

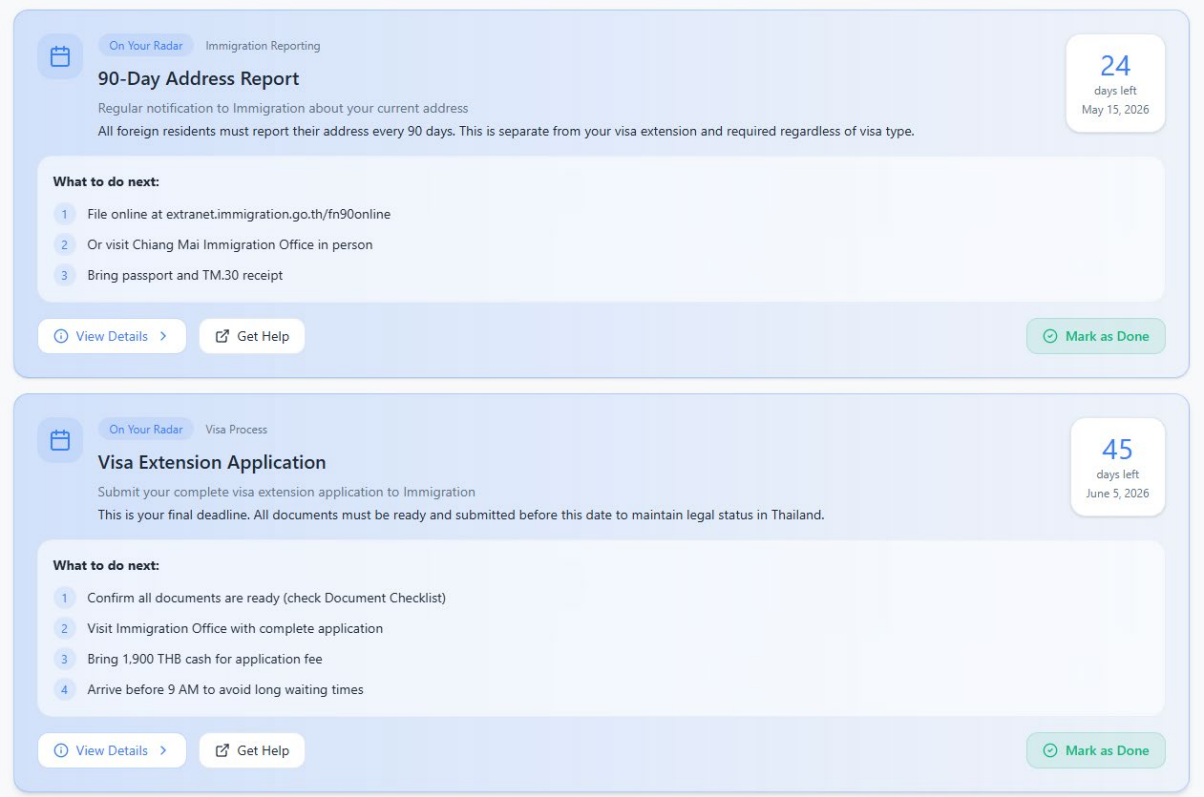


Figure 4 a Visa Alerts and Reminder System Interface

Knowledge-based and Taxonomy

The prototype includes a knowledge base system that functions as a centralized source of visa-related information within the platform. The interface organizes information into a structured knowledge taxonomy where users can search and browse topics based on their specific needs. Instead of reading through large amounts of unrelated information, users can explore categorized sections such as visa processes, required documents, deadlines and timing, offices and contacts, and common problems.

A major part of this section is the FAQ interface which were developed from common concerns and repeated inquiries identified during interviews, focus groups, and discussions with knowledge workers. By organizing these questions into searchable categories, the platform allows users to access practical information more quickly without needing to repeatedly contact staff members for clarification.

The knowledge base provides users with a more organized way to search, understand, and navigate visa-related information. The feature was designed not only to answer

questions, but also to help users better understand how different procedures, requirements, and offices are connected throughout the visa journey. Taken together, the knowledge base and knowledge taxonomy interface mainly respond to the issue of information fragmentation identified in the earlier stages of the research. By organizing visa-related information into a searchable and interconnected system, the platform may help users access information more efficiently while improving procedural understanding and reducing uncertainty throughout the visa process.

Support and Office Navigation

The last feature included in the prototype is the support and office navigation interface. This section was designed to help users better understand which office is responsible for different visa-related processes and how they can access the appropriate support more efficiently. The feature was developed based on findings from both students and knowledge workers in the Empathize stage, where many participants mentioned confusion regarding office responsibilities, communication channels, and administrative procedures.

The platform also includes a detailed office directory. Each office profile contains practical information such as office location, contact details, office hours, website links, and recommendations regarding the best time to visit. In addition, the system clearly explains what each office can and cannot handle. For example, the Immigration Office section explains and helps processed with immigration-related services such as visa extensions and re-entry permits, while the International Affairs Section focuses more on general guidance, document preparation and student support service within the university context.

One important aspect of this feature is that it helps reduce misunderstanding between students and responsible offices. Several participants mentioned that they were often referred from one office to another because they were unsure where to go or what documents they needed to prepare beforehand. To address this issue, the platform includes practical preparation guidance such as recommended documents to bring, consultation suggestions, and procedural reminders before visiting each office. Therefore, this feature mainly addresses the issue of administrative complexity identified in the earlier stages of the research. At the same time, it also supports procedural clarity and reduces communication difficulties by helping users access the right support at the right stage of the visa process.

Test stage

The Test stage focuses on evaluating users' experiences after interacting with the proposed prototype. In this study, usability evaluation criteria were used as the main approach for collecting feedback from both international students and knowledge workers. The purpose of this stage was to examine whether the platform was understandable, useful, and able to support users throughout visa-related processes in a practical way.

During the testing process, participants explored different features of the prototype, including the dashboard, visa journey guidance, document checklist, alerts and reminders, support navigation, and knowledge base system. After using the platform, participants completed a usability evaluation form using a five-point Likert scale ranging from strongly disagree to strongly agree. The evaluation focused on several criteria, including clarity of information, ease of use, navigation, usefulness, procedural understanding, visual organization, support effectiveness, and overall satisfaction. These criteria were selected because they are closely related to the main problems identified in the earlier stages of the research, particularly information fragmentation, procedural uncertainty, psychological burden, and administrative complexity.

Besides the quantitative evaluation, participants were also encouraged to provide open-ended feedback regarding their experiences while using the prototype. Additional comments and follow-up discussions allowed the researcher to better understand which features were most useful, what parts remained unclear, and what improvements could be made in future development. The quantitative results were analyzed using descriptive statistics such as frequency, mean, and standard deviation, while qualitative feedback was analyzed through thematic coding in order to identify recurring patterns and users' perspectives toward the platform. Including both students and knowledge workers in the evaluation process also helped provide broader insight into the prototype from different perspectives. Students mainly reflected on usability and support throughout the visa journey, while knowledge workers provided additional opinions regarding communication, information management, and practical implementation within the university context. Together, these findings helped the researcher better understand how the proposed platform may support both users and administrative processes in practice.

The usability evaluation involved a total of 52 participants, consisting of international students (n=48) and knowledge workers (n=4) who had previous experience with visa-related processes. The student participants included undergraduate students from the first to fourth year, as well as exchange students, internship students, and visiting researchers. This diversity of participants allowed the researcher to gather feedback from users with different levels of familiarity and experience regarding visa procedures. In addition, four knowledge workers who were responsible for supporting visa-related services for international students also participated in the evaluation process, providing perspectives from the administrative and operational side of the visa journey.

Overall, the evaluation results indicated positive perceptions toward the proposed platform. Participants generally agreed that the prototype was easy to understand, useful, and capable of supporting visa-related processes in a more structured manner. Many participants highlighted the value of having visa information, procedural guidance, document requirements, and support services integrated into a single platform. The dashboard, visa journey guidance, document checklist, and knowledge base were frequently identified as useful features that helped users navigate visa-related procedures more efficiently.

The findings from the usability evaluation were further examined in relation to the four major problem domains identified during the Empathize and Define stages, namely information fragmentation, procedural uncertainty, psychological burden, and administrative complexity.

By comparing users' feedback with the previously identified challenges, the researcher was able to assess how effectively the proposed prototype responded to actual user needs and whether the design features contributed to addressing the problems experienced throughout the visa journey.

Overall Usability Evaluation Results

To obtain an overall understanding of users' perceptions toward the proposed platform, the usability evaluation results were first analyzed using descriptive statistics, including frequency, mean, and standard deviation. The evaluation focused on eight usability dimensions: clarity of information, ease of use, navigation, usefulness, procedural understanding, visual organization, support effectiveness, and overall satisfaction. These dimensions were selected to assess whether the prototype successfully addressed the major challenges identified during the earlier stages of the study.

Table 4 Overall Usability Evaluation Results of the Visa Information Support Platform (n = 48)

Evaluation Criteria	Mean (M)	Standard Deviation (S.D.)	Interpretation
Clarity of Information	4.63	0.56	Very High
Ease of Use	4.48	0.62	Very High
Navigation	4.42	0.65	Very High
Usefulness	4.71	0.49	Very High
Procedural Understanding	4.67	0.53	Very High
Visual Organization	4.52	0.60	Very High
Support Effectiveness	4.58	0.57	Very High
Overall Satisfaction	4.69	0.51	Very High
Overall Mean	4.59	0.57	Very High

Table 5 Interpretation Criteria for Usability Evaluation Scores

Mean Score Range	Interpretation
4.21 – 5.00	Very High
3.41 – 4.20	High
2.61 – 3.40	Moderate
1.81 – 2.60	Low
1.00 – 1.80	Very Low

From the Table 4 and 5, the data collection gained from students presents the overall usability evaluation results. The overall usability evaluation results indicate that participants had positive perceptions toward the proposed platform. All evaluation dimensions received mean scores within the "Very High" range, with an overall mean score of 4.59 (S.D. = 0.57). Among the evaluated dimensions, usefulness received the highest rating (M = 4.71, S.D. = 0.49), followed by overall satisfaction (M = 4.69, S.D. = 0.51) and procedural understanding (M = 4.67, S.D. = 0.53). These findings suggest that participants perceived the platform as a useful and practical tool for supporting visa-related processes and improving their understanding of visa procedures. The consistently high ratings across all dimensions also indicate that the prototype was generally well received by both international students and knowledge workers. The positive evaluation results provide preliminary evidence that the proposed platform has the potential to support international students in navigating visa-related processes more effectively.

Table 6 Comparison of Usability Evaluation Results Between Students and Knowledge Workers

Evaluation Criteria	Mean (M) Students (n=48)	Mean (M) Knowledge Worker (n=4)
Clarity of Information	4.63	4.75
Ease of Use	4.48	4.50
Navigation	4.42	4.75
Usefulness	4.71	4.75

Procedural Understanding	4.67	4.75
Visual Organization	4.52	4.50
Support Effectiveness	4.58	4.75
Overall Satisfaction	4.69	4.75

Table 6 presents a comparison of usability evaluation results between international students and knowledge workers. Overall, both groups reported positive perceptions toward the proposed platform, with all evaluation dimensions receiving high mean scores. This finding suggests that the prototype was generally perceived as understandable, useful, and relevant by both primary users and administrative stakeholders.

For international students, the highest ratings were found in usefulness ($M = 4.71$) and overall satisfaction ($M = 4.69$), indicating that participants believed the platform could effectively support visa-related processes and improve their overall experience. Procedural understanding also received a high score ($M = 4.67$), suggesting that features such as the visa journey guidance and document checklist helped students better understand visa procedures and requirements.

Similarly, knowledge workers provided highly positive evaluations across most dimensions. Several dimensions, including clarity of information, navigation, usefulness, procedural understanding, support effectiveness, and overall satisfaction, received mean scores of 4.75. This indicates that knowledge workers perceived the platform as having strong potential to support communication, information dissemination, and administrative services related to international student visa management.

Although knowledge workers generally reported slightly higher scores than students, the differences were relatively small. This suggests that the prototype was well received by both groups and may serve as a shared platform that supports the needs of students while also facilitating information management and service delivery from the administrative perspective. Overall, the findings provide preliminary evidence that the proposed platform may contribute to improving both user experience and operational support within the university context.

Open-Ended Feedback Analysis

In addition to the usability evaluation scores, participants were invited to provide open-ended feedback regarding their experiences while interacting with the prototype. The purpose of collecting qualitative feedback was to obtain a deeper understanding of users' perceptions, identify strengths and limitations of the proposed platform, and explore whether the prototype effectively addressed the challenges identified during the earlier stages of the study. The responses were analyzed using thematic coding, and recurring patterns were grouped into themes based on similarities in participants' comments.

Table 7 Summary of Open-Ended Feedback Themes

Coding Thematic Analysis	Representative Issues	Problem Domain Relations (From Empathize and Define Stage)
Information Accessibility and Centralization	Easier access to information, single source of information	Information Fragmentation
Improved Procedural Understanding	Clear steps, better document preparation	Procedural Uncertainty

Coding Thematic Analysis	Representative Issues	Problem Domain Relations (From Empathize and Define Stage)
Reduced Uncertainty and Psychological Burden	Increased confidence, reduced worry about deadlines	Psychological Burden
Support for Administrative Processes	Improved communication, reduced repetitive inquiries	Administrative Complexity

The findings from the Test stage suggest that the proposed prototype was positively received by both international students and knowledge workers. The usability evaluation results demonstrated high levels of perceived usefulness, clarity, procedural understanding, and overall satisfaction, while the open-ended feedback provided additional insight into how participants experienced the platform in practice.

In overall summary, these findings suggest that the proposed platform may serve as a practical tool for supporting international students throughout visa-related processes while simultaneously improving information management and communication within the university context.

The results also demonstrate how the integration of Design Thinking, Customer Journey Mapping, and knowledge management concepts can contribute to the development of user-centered solutions that respond directly to real-world challenges identified by both users and service providers.

Conclusion and Discussion

This study demonstrates how a user-centered approach can be applied to understand and improve visa-related experiences among international students at the Faculty of Humanities, Chiang Mai University. Guided by the Design Thinking framework, the study moved from exploring users' experiences to developing and evaluating a conceptual digital platform for visa information services. The findings revealed that visa-related challenges were not limited to administrative requirements, but were also shaped by students' ability to access reliable information, understand procedures, manage deadlines, and navigate multiple support systems.

In relation to thematic analysis, the study supports Braun and Clarke's (2022) emphasis on qualitative analysis as an interpretive process that connects data, research questions, and theme development. Four major problem domains were identified: information fragmentation, procedural uncertainty, psychological burden, and administrative complexity. Information fragmentation occurred when students had to search for visa information from multiple sources, which often led to confusion about accuracy and reliability. Procedural uncertainty reflected difficulties in understanding required documents, process sequences, and next steps. Psychological burden emerged from concerns about deadlines, mistakes, and possible consequences for visa status. Administrative complexity was related to the need to coordinate with multiple offices and understand divided responsibilities across institutional and external units. These findings suggest that visa-related experiences should be understood as an interconnected journey rather than as separate administrative tasks which support Brown (2008) studies that Design Thinking should begin with a deep understanding of human needs and real user experiences. Similarly, the iterative process used in this study reflects Liedtka's (2018) argument that Design Thinking helps reduce uncertainty through user engagement, experimentation, and continuous learning.

The use of Customer Journey Mapping provided a clearer understanding of how these challenges emerged across different stages of the visa lifecycle, including information search, document preparation, process execution, monitoring and follow-up, and termination. This mapping showed that problems at one stage could influence later experiences. For example, fragmented information during the early stage could lead to procedural uncertainty during document preparation and increase stress during deadline-sensitive stages. Therefore, improving visa support requires more than simply providing additional information; it requires organizing information and support in ways that align with students' actual journeys.

From a knowledge management perspective, the findings can be explained through the SECI model. Students' and knowledge workers' experiences initially existed as tacit knowledge embedded in personal practices, informal communication, and daily problem-solving. The study also aligns with the knowledge creation from the previous discussion of Nonaka and Takeuchi (1995). Through interviews, focus groups, thematic analysis, and Customer Journey Mapping, this tacit knowledge was gradually externalized into explicit themes, problem statements, and design requirements. The prototype then represented the combination of these insights with formal visa information, procedural guidelines, and institutional knowledge. In this sense, the proposed platform functions not only as an information tool but also as a mechanism for capturing, organizing, and sharing knowledge within the university context.

The conceptual prototype developed in this study integrated six main features: a dashboard overview, visa journey guidance, document checklist, alerts and reminders, knowledge base taxonomy, and support and office navigation. These features were designed to respond directly to the identified problem domains. The dashboard and knowledge base addressed information fragmentation by centralizing information. The visa journey guidance and checklist supported procedural understanding by presenting requirements in a clearer and more structured manner. The alerts and reminders responded to psychological burden by helping students monitor deadlines and reduce uncertainty. The support navigation feature addressed administrative complexity by clarifying responsible offices and communication channels.

The usability evaluation showed positive responses from both international students and knowledge workers. Participants perceived the prototype as useful, understandable, and relevant to their needs. In particular, features such as the visa journey guidance, document checklist, dashboard, and knowledge base were viewed as valuable because they helped users make sense of complex procedures rather than merely providing information. This finding highlights the importance of designing digital platforms that support understanding, decision-making, and user confidence. The open-ended feedback further suggested that the platform could improve information accessibility, reduce confusion, support deadline management, and enhance communication between students and administrative staff.

Overall, the study contributes to the discussion of international student support by showing that visa-related services should be designed from the user's perspective. The integration of Design Thinking, Customer Journey Mapping, and the SECI model provides a practical framework for transforming fragmented and experience-based knowledge into a structured digital solution. Although the prototype remains conceptual and was not tested as a fully operational system, the findings indicate its potential to improve the administrative experience of international students and support more effective knowledge sharing within the institution. Future research should develop the prototype into a functional platform, evaluate its real-world use, and examine its impact on service efficiency, user satisfaction, and administrative workload.

Limitations

Limitation of research context and participant scope

The study was conducted within the Faculty of Humanities, Chiang Mai University, and focused on international students and knowledge workers who were directly involved in visa-related processes within this specific context. Since all respondents were limited in the faculty operation level, the findings may not fully represent the experiences of international students in other faculties, universities, or educational systems.

Limitation of conceptual prototype development

The prototype presented in this study represents a proof of concept rather than a fully operational digital platform. It was developed to explore the feasibility of the proposed design and collect user feedback on its usability and relevance. The study did not evaluate actual system implementation, integration with institutional information systems, or long-term user engagement, which remain opportunities for future research.

Recommendations for Future Research and Development

The proposed prototype represents an initial step toward improving visa-related support services for international students. Future research could expand this work by implementing the platform in real institutional contexts and examining its practical value for both students and university staff. Longitudinal studies may also explore how continued use of the platform influences information-seeking behavior, knowledge sharing, service quality, and users' overall experience throughout the visa process.

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