

THE THAI JEWELRY INNOVATIVE DESIGN CO-CREATION LANDSCAPE: A CASE STUDY OF UNIVERSITIES AND SMES

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ABSTRACT

The objective of this research was to study the factors related to the establishment of the design collaboration between universities and the small and medium-sized entrepreneurs in the gems and jewelry industry of Thailand because this industry has a high export value and is also an important driver of the national economy of Thailand. Further, the industry is at risk for a shortage of design personnel and facilities in the near future because the rate of students graduating from universities in this field is decreasing. Creating and developing skills as well as expertise are important in the organization, but accumulating experience takes time. According to qualitative research studies, the groups of factors include “In Focus”, which is the first priority group. The secondary importance is the “Attention”, while the last group that needs to be maintained is the “Maintain”.

Keywords: Jewelry Co-Creation, Thai Jewelry Design Education, University and SMEs Jewelry Collaboration, Triple Helix

INTRODUCTION

At present, the quality of the products and services may not fully meet all customer needs (Jermsittiparsert, 2019; Mee-ngoan, Nuakaw, Sirariyakul, Tomcharoen & Jermsittiparsert, 2020). Many organizations operate their businesses with a strategy of co-creation to create products and services that give consumers more choices. This is a new strategy that is the focus of current business operations, which also involves adapting to changes that require speed. For example, the introduction of technological innovations has been applied to the product development period. Co-creation offers firms and their network of actors significant opportunities for innovation. According to (Prahalad & Ramaswamy, 2004), “The transition from a firm-centric view to a co-creation view is not about minor changes to the traditional system.

In Thailand, co-creation foundation strategies have been studied to create competitiveness and sustainability. The government has pushed for micro-cooperation among high-value products. It can be said that the gems and jewelry industry is an industry of significant interest as it accounts for one-fifth or 261,552 million baht in exports. Roughly 65 - 70% of the country's employment is driven, although the number of small and medium-sized enterprises in the gem and jewelry industry accounts for less than 1% in 2018. Despite this, there were only 5,478 out of the total number of 424,169 entrepreneurs (Source www.sme.go.th, retrieved on 4 June 2019). Although, the data on the fact sheet from the National Gem and Jewelry Research and Development Institute from 2015 to 2017 also shows several issues existing in the gem and jewelry industry and one of these issues is a lack of design personnel and facilities. Therefore, this shortage of personnel is in line with the statistics from the Office

of the Higher Education Commission, which found that the number of graduates in gem and jewelry design has continued to decline. In 2018, there were just 131 out of 253,843 graduating students in the jewelry, design, and fabricating fields. This has made Thailand vulnerable to personnel shortages for institutions entering the industry to create innovative for more competitive advantage.

This study focuses on identifying the relationship factors for building co-creation cooperation between the education sector and entrepreneurs to develop innovative jewelry design. In addition, there are also arguments from Miller's (2014) study regarding conflicting objectives between each of the stakeholder groups (*i.e.*, academics, industry liaison staff, technology transfer office staff and government support agency representatives) that have led to the university business model evolving not as a process of co-creation, but rather in a series of transitions whereby multiple stakeholders are continually shaping the university business model through strategies that are dependent upon their salience (Kristel Miller, 2014). The researchers started this study by carrying out a literature review of the successful cooperation factors that exist, followed by studying the overview of the gem and jewelry industry. Moreover, collaboration and its limitations were assessed with the in-depth interviews were conducted on the factors that facilitate collaboration, with a focus on the two sample groups that are fundamental to building and developing industry personnel, comprising the education sector and small and medium-sized enterprises. The results of the study provided an awareness of the interrelated factors to confirm the relationships of the variables by quantitative research, leading to the creation of prototypes for future design collaboration in subsequent studies.

LITERATURE REVIEW

The study of successful cooperation factors in other foreign industries with an open innovation cooperation structure foundation was conducted. The innovative model of cooperation can be two-party, three-party, or four-party. The key factors for building cooperation consist of 10 main factors, as shown in Table 1, which are as follows: Sustainable networking system, a communication platform, group creativity, trust, skills, drive for development, facility customization, knowledge management, agility mindset and commercialization of technology.

Research Key indicators	Authors (year)	Stakeholders	Methodology	Findings
-Sustainable networking system	Maninggar, Hudalah, Sutriadi & Firman (2018)	Government, University, & Industry	Semi- structured and focused interviews	Dynamic ability of Regional Innovation System (RIS) with exclusive communication learning environment, local government facilitating formal and informal collaboration between education institutions, industry and research
-Communication platform	Leydesdorff, Ivanova & Meyer (2019)	University, Industry and Government	Empirical research	Horizontal and vertical differentiation contributes to the social construction of a knowledge-based structure that combines stakeholders and the relationship construction of institutional data for distribution and collaboration

-Group creativity -Trust -Skills	Wongpreedee, Kiratisin & Virutamasen (2015)	University, Industry and Government	Observations	Collaboration of three stakeholders by promoting OEM to OBM for the Thai gems and jewelry sector through classroom-based activities in order to develop personal skills, creativity, and entrepreneurial mindset.
-Drive for development	Lind, Styhre & Aaboen (2013)	University and Industry	In-depth interviews with various degrees of involvement with industry	Types of collaboration: firstly, general participation by the industry taking the motivation role for financing and education, while the university takes the role of knowledge development to contribute to the research; secondly, translational, which involves more connections between industry and universities to increase the value input and maintain research routine activities; thirdly, specified, which determines the industry performance according to specific tasks; and fourthly, developed, whereby two stakeholders are engaged and knowledge transfer is acknowledged
-Facility customization	Frow, et al., (2015)	University and Industry	In-depth interviews and facilitation workshop	The first part shows that co-production is an approach to co-creation design that involves developing an outline that incorporates design dimensions and groups the new co-creation opportunities. The second part is about outspreading the application of a specific design approach in the framework of co-creative activities.
-Knowledge management - Agility mindset system	Leydesdorff, et al., (2019)	University and Industry	In-depth interviews	A cluster of partners who are interested in the academic unit's view or industry comprising specific academic data through research findings and problem solving. The most interesting and crucial drivers are design integrated into project-based study in the syllabus, bottom-up movement, centralized for design thinking, technology, transmission and digital knowledge sharing platforms.
-Commercialize technology	Riviezzo, Santos, Liñan, Napolitano &	Industry	Semi- structured and in-depth	The components of entrepreneurial orientation

	Fusco (2019)		interviews	are the university's capability to generate patents and spin-offs by co-operating in technology transfers, concentrating on the instruments of knowledge transfer, education and activities However, the out-of-scope factors that are not yet considered include the subsidiary environment, the type of entrepreneurial university and the number of graduates.
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Table 2		
FOSTERING FACTOR DEFINITIONS		
Fostering factors	Meaning	Authors
Drive for development	Innately active and growth seeking, with a natural tendency to develop an integrated self to situational challenges	Stenius, Haukkala, Hankonen & Ravaja (2017)
Agility mindset	Ability of an organization to sense and respond with a relative degree of speed to environmental changes and to take advantage of new opportunities	Baskarada & Koronios (2018)
Skills	Expertise encompasses everything that a person knows and can do in the broad domain of his or her work	T. Amabile (1998)
Communication platform	Automatically generate an organizational document structure according to project information The structure can then be downloaded and applied in a collaboration platform with the aim of ensuring that all stakeholders work with the same.	Forcada, Casals, Roca & Gangoellis (2007)
Technology commercialization	Technology commercialization strategies are vital for innovative firms, especially when they are inside innovators who are not only technology providers but also producers of the final products	Sougata Poddar (2004)
Facility customization	Facility portfolio on the accuracy, granularity, and credibility of facility data available to the organization	Clayton (2013)
Group creativity	Individuals creativity becomes in the organizational environment and the providing of the organizational creativity	Amabile (2017)
Knowledge management	Knowledge processes help to enhance the organization's learning capability	Nonaka & Takeuchi (1995)
Sustainable networking system	This is concerned with networked relations among institutions and organizational changes in the process of innovation Stakeholder engagement involves much more than just simple interactions, <i>i.e.</i> , the wants, needs, and capabilities	Noland & Phillips (2010).
Trust	A certain confident confidence between the parts involved during a process of exchange	David Read (2014)

PREVIOUS COLLABORATION MODELS

From the review of the literature in other industries in Asia, it was found that the key to successful collaboration is to have strong fundamental stakeholder engagement, especially for those who need to drive the long-term practices, including education and entrepreneurship. Local government policy frameworks have played a major role in facilitating formal and informal collaboration between research and educational institutions and the batik industry in Pekalongan (Maninggar et al., 2018). The interaction requires a supportive environment for stakeholders. There is an exchange of knowledge that leads to trust as well as joint research and development of product innovation with full permission to share the space. In Thailand, cooperation model between the government and universities to develop gem and jewelry design skills, with the government supporting the training cost that the education sector provides R&D to entrepreneurs so that entrepreneurs and designers can create knowledge that will be applied to the design process as shown in Figure 1. Moreover, there is cooperation of Figure 2 by the National Gem and Jewelry Research and Development Institute (Public Organization) as a join driver with the education sector, as a join driver with the education sector, entrepreneurs and associations with a budget sponsor, supports facilities to create a model company in the universities to design, develop and present at trade shows together such as the Colored Gem Traders Association in Chanthaburi, the Jewelry Trade Association, the Thai Craftsmanship Association, and others with a co-creation strategy.

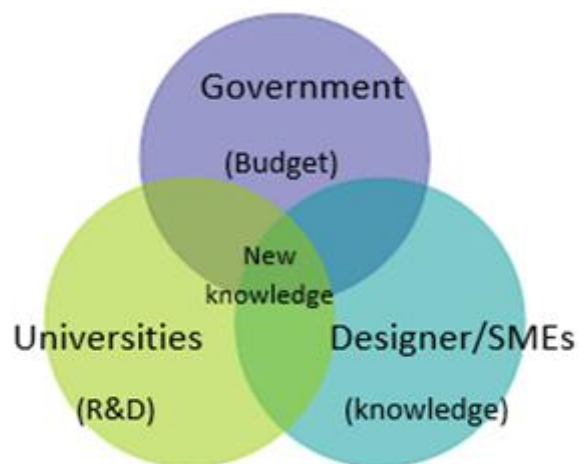


FIGURE 1
A MODEL OF COOPERATION BETWEEN THE GOVERNMENT AND UNIVERSITIES



FIGURE 2

A MODEL OF COOPERATION BETWEEN PUBLIC ORGANIZATION AND THE ASSOCIATION

In Thailand's gems and jewellery industry is characterized as a policy cooperation approach, delegated from top to bottom, namely from the government sector and the Gem Trade Association of Thailand to entrepreneurs, designers, and students. It has advantages in terms of budget support, skilled personnel and free training, but the disadvantages are the limited time frame and risk from external factors such as changing governments and changing management agencies, including influences on policy and budget allocation to support cooperation with teaching and learning styles. For design education, students indicated that they need a clear guide to help them search for more case methodologies and ease the burden of learning about visualization tools for the co-design process. Therefore, finding a dynamic model and cooperation factor that is operator-driven is likely to be an interesting topic within the context of Thailand.

RESEARCH METHODOLOGY

This study uses a qualitative research approach with 12 in-depth interviews as detailed

Organization	Position	Method
1) The Gems and Jewelry Designs Institute, Rajamangala University of Technology Phra Nakhon	Director	Face to Face
2)-3) The Faculty of Gemological Sciences, Gem and Art, Rambhai Bami Rajabhat University		Face to Face
4) Fine and Applied Arts, Burapha University	Dean and Head of Jesselly Design Department	Face to Face
5) Poh-Chang Academy of Arts, Rajamangala University of Technology Rattanakosin SMEs	Head of Department Jewelry Design	By phone
6) North-Sukhothai	Head of Department Jewelry Design	By phone
7) East-Chanthaburi	Entrepreneurs	Face to Face
8) Central-Bangkok	Entrepreneurs	Face to Face
9) Central-Bangkok	Entrepreneurs	By phone
10) Central-Nakhom Pathom	Entrepreneurs	Face to Face
11) South-Nakhon Si Thammarat	Entrepreneurs	By phone

RESULTS

Assessing the Factors that are important to Building Collaboration between Education and Entrepreneurs through In-Depth Interviews

The study involves 10 factors of self-assessment with an open-ended questionnaire on the current design and limitations to determine the important factors. The researcher examined the Interdisciplinary Triangulation, which compares the findings from different sources and perspectives with the same set of questions to confirm the reliability of findings. The triangulation has been applied to serve two distinct purposes, including confirmation and completeness (Annells, 2006).

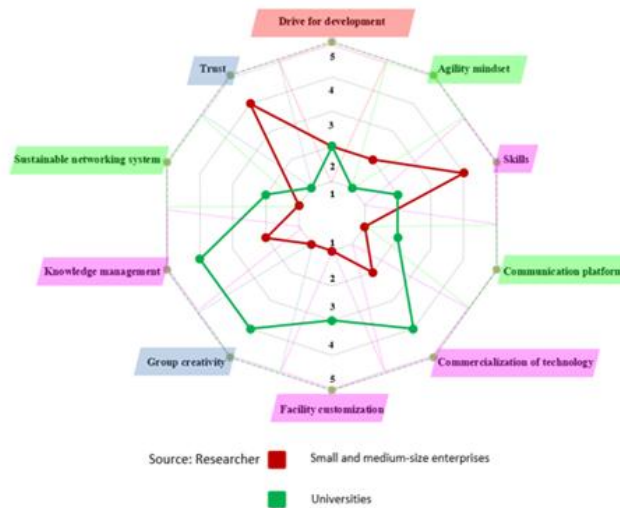


FIGURE 3
TRIANGULATION OF QUALITATIVE DATA FOR COLLABORATION FOSTERING THE FACTORS

In Figure 3, it is shown that the key factors contributing to the creation of design collaboration in the university sector (green line) are higher level than the SMEs (red lines). At present, the education sector has the potential to support the creation of collaboration in trustworthy design, as well as create group creativity, structure of communication forms, knowledge management, commercial utilization and sharing of facilities to promote as a sustainable network. Moreover, there are three factors that cause universities to have a lower assessment: design skills, agility to speed of adapting to the changes and trust. However, the research presented two perspectives. The first view is the score of the assessment, grouped into three ranges: low-level scores at 1 - 2 points, while intermediate scores were 3, and high scores at 4 - 5. The second view is the degree of difference with three group the low-medium-high difference level.

Table 4 DIFFERENCE SCORE			
Rating Score	Meaning	Difference Score	Meaning
5-Apr	High	3	High
3	Medium	2	Medium
2-Jan	Low	1	Low

Group 1 – ‘In Focus’ is the most important factor group, which is the factor with a high universities assessment score, while entrepreneurship was low and the assessment difference score was high, namely the trust factor and initiatives in which trust is a sensitive factor and can be both a strength and a weakness. Trust is a vital governance mechanism that enables companies to (1) mitigate safeguarding, (2) establish efficient resource-sharing routines, and (3) integrate and leverage complementary competencies for collaborative advantages (David Read, 2014) and the factor aspects of the group initiative, as “Positive creative experiences lead to

increased persistence and interest in activities (Csikszentmihalyi, 1999)". In the in-depth interviews, the researchers found that the entrepreneurial assessment score of group initiative factor was higher than that of the universities because it is opened-working with a structure and form that requires an exchange, interacting both with in the university and between universities, as well as with government agencies and the private sector easily and more conveniently. This is different from entrepreneurs in terms of the trust factor, entrepreneurs pay great attention, by which it is shown that there is a large gap between the entrepreneurs and the education sector because entrepreneurs have a closed-working approach and are afraid of losing competitiveness. In order to develop a relationship to build trust until it leads to joint thinking and creativity, both sectors need to see the same level of importance, or cooperation will not happen. Therefore, we may consider having a recognized regional mediator to drive relationships and build trust through dialogue and knowledge exchange. The group of the 'In Focus' factor is sensitive and, at the same time, very impactful if it is successful. A limitation is that it cannot be easily defined within a time frame. Once it is, however, it will build strength, move quickly and create sustainability in the future. Group 2 – 'Attention' has a lower score and the assessment difference, including the awareness factor in the development of design skills. The motivational factors are a sense of achievement, recognition, the pleasure of the work itself, a sufficient level of responsibility, personal advancement, and personal growth and learning (Ellis, 2016). The speed of environmental adaptation, a sustainable form of communication and networking are included although the awareness factor for developing design skills, which was the only factor that had the same level of assessment between the universities and the entrepreneurship, was below the researcher-specified criteria. The researchers conclude that this is the strength of the gems and jewellery industry in which both sectors are active, trying to find new opportunities to prepare themselves and the agency to develop design skills on a regular basis. Therefore, the government and related parties should consider the presence of a central agency providing, receiving, coordinating, and distributing information centrally to the region and forming the factors of communication. The last factor having a low rating and a low difference score is a sustainable network, which is a long-term view and is difficult for small and medium-sized entrepreneurs depending on the vision of each entrepreneur. Networking, win-win situations and a strong problem-solving orientation were identified as the key success factors that may accelerate efficient future Triple Helix collaboration and cooperation for ensuring a higher innovation diffusion success (Brem & Radziwon, 2017). Sustainability emphasizes that the integration of external actors enables the sharing of knowledge and skills regarding materials, processes, use of products and components (Todeschini, Cortimiglia & de Medeiros, 2020). Group 3 which is called 'Maintain'. This is a group of factors with an intermediate universities assessment score level - Operators in the middle level - and the score difference of the assessment is in the middle level. The researcher defines and prioritizes this factor group in a correlation-stabilization model, including with design skills, commercial technology utilization, facility use, and knowledge management by the design skills, which can be classified into the two sectors that each have a different knowledge base. The academic sector has the theoretical and technological knowledge that support the design. Entrepreneurs have experience and expertise in operations with different strengths. If the two sectors are interchangeable, they will strengthen themselves in the long term. In terms of the commercial technology utilization factors, the education sector has an advantage in making it ready for commercial use. Technology entrepreneurs involve development costs and production costs, so if they bring the education sector availability to entrepreneurs, they can create value for their products and reduce the time of early product development, thereby accelerating and value-adding to the process of technology commercialization that is driven by ideas. Indeed, the entire commercialization process is the realization of a vision based on ideas (Riel, Draghici, Draghici, Grajewski & Messnarz, 2012). The researchers were able to analyze that the education sector has well organizational structure to contributes and leading to commercial viability. Although the skill factor of the designs is the same level as the other factors, it is the only factor that the higher self-evaluating to explain that education and entrepreneurship have different skill sets.

PROPOSED COLLABORATION MODEL AND KEY FOSTERING FACTORS

The scores of assessments of both sectors was shown that the current model in Figure 1 and Figure 2 has low dynamic capabilities and focused on short-term goals. It has high costs and ad hoc stakeholder engagement, making it move slowly with an inability to create regional innovation. The researchers proposed the linear model to develop dynamic capabilities in the field of technology and various facilities of the universities or gain advice and support from the faculty and government-supported budgets to provide a space for creating jewelry designs together. The flexible structure of inter-institutional communities of practice can enable radical innovations to be encompassed more readily than in fixed internal organizational structures (Jameson et al., 2006).

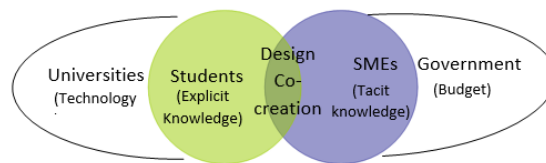


FIGURE 4
LINEAR DOUBLE HELIX COLLABORATION (SMES-UNIVERSITIES)

CONCLUSIONS

According to the results of this qualitative research between universities and small and medium-sized enterprises, this is only a preliminary study of the correlation of factors affecting the establishment of design collaboration between the relevant sectors and entrepreneurs. From the results, it was found that there are factors that stand out from the self-assessment and the classification of the different point scores. Therefore, the researchers will prioritize the study in the next step to confirm the model in Figure 4, as the concept of linear collaboration is presented. Concerning the key indicators of the “In Focus” and “Attention” groups are the most important, including trust and group initiative, because the creativity of the group requires knowledge sharing and discussion, which can only occur when the members in the group trust each other and are ready to share and not lose competitive skills. The awareness factors for design skill development, the speed of adaptation to the environment, and the sustainable forms of communication and networking form another key factor group having clear assessment scores and assessment differences. It was found that the awareness factor in the development of design skills was the only factor that both sectors had score spacing at the same level. This means that there is a positive correlation and shows the interest and readiness to receive new knowledge to be constantly seeking for opportunities to develop and become more capable, according to Dr. Amabile's (1998) theoretical initiative. The skills of creative thinking go through the process of constantly conceiving of new details and being inspired. The last group factor is “Maintain” group. This is the group of design skill factors, commercial technology applications, facilities sharing and knowledge management with a moderate level of points and spacing of the two sectors. The relationship of cooperation should be maintained at this level in order to focus on driving the first two factors to be strong and more flexibility. However, this study is only intended to determine the correlation factor to establish design collaboration between the education sector and small and medium-sized enterprises, with only qualitative research and quantitative studies needed to confirm the model in Figure 4 using the illustrated sequence.

LIMITATIONS AND SUGGESTIONS

Although this study only focuses on the first phase of proto type development in the dimensions of micro-cooperation in the gem and jewellery industry. Regarding the ever-changing environment, especially since the COVID-19 crisis, it should therefore be considered and optimized for future research.

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