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Entrepreneurial management skills, product innovation technology and business performance of jewelry companies: Basis for business innovation framework

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Abstract

The purpose of this research is to explore the business innovation framework for current Chinese jewelry companies, in the aspects of entrepreneurial management skills, product innovation technology and business performance. Analyzing entrepreneurial management skills, product innovation technology and business performance can provide a new innovative framework for current Chinese jewelry companies to adjust their business strategy. This study adopted descriptive design and collected quantitative data of respondents through questionnaire surveys. The survey results show that most of the respondents are general employees from listed jewelry companies in China (529). All respondents believe those three factors can help jewelry companies to develop their sustainable business development. This research found out entrepreneurial management skills, product innovation technology and business performance have highly significant relationships among each other. Therefore, entrepreneurial management skills are the core part for innovative jewelry business and all the dimensions of entrepreneurial management skills are important for innovative jewelry business., such as conceptual skills, technological skills and interpersonal skills. The second important factor is business performance related to sustainable development, marketing, innovation and production development. Entrepreneurial management skills can positively influence the current business performance in the aspects of marketability, sustainability, as well as innovation and production development. The entrepreneurial management skills and business performance interact with each other. The study provided specific contributions to the knowledge of how to improve business performance through utilization of entrepreneurial management skills through innovation technologies for products. It will also add to the existing literature on entrepreneurship, innovation, and business performance within the field of the jewelry industry. The results would further connect with others in suggesting new frameworks or models to explain the interplay between the entrepreneurial management dimensions, product innovation, and business performance in the jewelry industry.

Keywords: business performance, entrepreneurial management skills, jewelry business, product innovation technology

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Entrepreneurial management skills, product innovation technology and business performance of jewelry companies: Basis for business innovation framework

1. Introduction

This study investigated a business innovation framework for jewelry companies, focusing on entrepreneurial management skills, product innovation technology, and the business performance of these companies. The framework aims to assist jewelry firms in successfully transitioning from traditional jewelry operations to personalized and sustainable jewelry businesses during the Industry 4.0 era. In recent years, the global jewelry market has been experiencing robust growth. As the global economy continues to grow steadily and people's disposable income and purchasing power increase, the demand for luxury goods such as gemstones and jewelry has increased sharply. Driven by the increase in disposable income and shifting consumer preferences, the international jewelry market has begun to emphasize the uniqueness of jewelry products and the introduction of DIY services, such as customized wedding rings and anniversary jewelry. Besides, Asian consumers have become the main consumers, especially for China. However, jewelry innovative design has been dominated by world well-known jewelry brands, such as LVMH, Richemont, Signet Jewelers, Bvlgari, Cartier, Tiffany, Chow Tai Fook. Most of the famous international jewelry brands are from the European region, meanwhile only few Asian brands have strong innovative power.

Therefore, this indicates that jewelry companies in Asia need to enhance their capacity for business innovation. The development of innovation capacity has been already unbalanced, which is not good for Asian jewelry firms development. This is a business plight for global market development, which is the main problem of regional development being uneven. Furthermore, the Chinese jewelry market only focuses on the product imitation and lower price. This may bring the jewelry sector into a vicious circle, which is not sustainable. Current Chinese jewelry industry developments are related to the shortage of awareness, insufficient investment, innovation production technology, and talented and professional management skills. These constraints limit Chinese jewelry innovative business sustainable development. Most Chinese jewelry firms are lacking innovation business ability, which may negatively affect long-term business performance. That is a challenge for jewelry innovation business development.

In order to develop jewelry innovation business, entrepreneurial management skills, product innovation technology and business performance are vital. Deeply, entrepreneurial management skills can be used as soft competitive power to manage internal operation business. Product innovation technology can be used as a tool to realize the creative image and to increase the service diversity and production efficiency (Rane et al., 2024). Besides, positive business performance can assure sufficient cash flow to support daily business and can be assessed based on marketability (Zhu et al., 2024).That is why the researcher uses those three variables.

As for production innovation technology, current jewelry companies have grasped the mature production technology. Advanced product innovation technology could improve the product innovation and provide diversified jewelry products and services, as well as increasing the production efficiency (Wang, 2024). Moreover, product technological innovation could bring revolution for the jewelry industry, such as the jewelry products' styles, production mode, customers' service and materials (Shi et al., 2023). The majority of research on jewelry sustainability has focused on product innovation technology and sustainable design. However, the impact of entrepreneurial management skills on the application of product innovation technology has been largely overlooked by current researchers. As a result, the role of product innovation technology in this context is an area that deserves further exploration.

Entrepreneurial management capabilities and production innovation technologies are crucial in determining the business performance of Chinese jewelry companies. Business performance, which includes both financial

and non-financial measures, is a holistic indicator of the success of these firms. Additionally, it is a vital factor in establishing their competitive advantage in the market (Zhu et al., 2024). The current body of research focuses on the relationship between product innovation technology and the business performance of Chinese jewelry companies. While some studies have demonstrated that advanced product innovation technology positively impacts innovative business performance, the influence of users on these technologies has been largely overlooked by researchers. Because the jewelry business is a unique fashion industry, the core competition is around the creative designers, the users are the main power for the business performance, instead of innovative product technology. For those reasons mentioned above, how to improve sustainable and innovative business performance is worthy to be analyzed.

Entrepreneurial management skills may be the soft competitiveness for Chinese jewelry companies. Product innovation technology may be used as a tool to realize product innovation, which can be treated as the hard competitiveness for Chinese jewelry companies. Additionally, appropriate business strategies may help Chinese jewelry companies to have the correct sustainable business development direction. Marketing, sustainability and the innovation and product development may help Chinese jewelry companies to find out their own suitable business strategies, which may be good for the sustainable business development and increase their core competition.

This research seeks to provide new insights and actionable business management strategies for small and medium-sized Chinese jewelry firms, helping them to improve their sustainable business performance within a highly competitive market landscape. The contribution of this research is to provide an innovative model for small and medium size Chinese jewelry companies to find out their drawbacks, improve their business management system and adjust their business strategies to adopt the fierce competitive jewelry business environment and develop their unique business pathway.

Objectives of the Study **-** The study aimed to analyze the relationship among entrepreneurial management skills, product innovation technology and business performance of jewelry companies and to develop a business innovation framework of Chinese jewelry companies. Specifically, it identified the entrepreneurial management skills in terms of conceptual skills, technical and interpersonal; described the product technology innovation as to creativity, production efficiency and customization and personalization, assessed the business performance as to innovation and product development, marketing and sustainability, tested the significant relationship among entrepreneurial management skills, product innovation technology and business performance and developed an innovative business framework for jewelry companies.

2. Methods

Research Design **-** This study employed a descriptive research design, which aims to depict the characteristics of the population or phenomenon under investigation. The descriptive method of this research is useful when the researchers do not know yet about the topic or problem at the beginning stage. The descriptive method centers on analyzing data results. which is valuable for detecting patterns and subsequently interpreting the underlying phenomena. In this study, the researcher's primary task was to investigate the relationships among three key dimensions and to develop an innovative business framework tailored for Chinese jewelry companies. To achieve this, the researcher opted to use questionnaires as the data collection tool. By examining the data outcomes, the researcher was able to identify business patterns and elucidate the observed phenomena. These considerations underpinned the decision to employ a descriptive research design.

Participants of the Study **-** This research chose convenient purposive sampling to do the investigation, which is suitable for this study, because the sample group was chosen intentionally, based on their professional background information, knowledge background and career development background. 529 participants were from the 5 largest listed jewelry companies who worked as general employees. Those 5 companies had mature internal and external management systems, which could provide some useful management suggestions for

Chinese jewelry companies' business development. Respectively, 3 companies were located in Hong Kong and Shenzhen city Guangdong Province. Another 2 were located in Shanghai city. The limitation of this research was only focus on the Pearl River Delta and Yangtse River Delta. Those 5 companies' business benefited from the support of economic policies in those two regions. This research might ignore other parts' jewelry companies' objective condition. This was the bias for the research. As for the participants, those participants had working experiences in those 5 largest listed jewelry companies. They had first-hand experience of working life in those companies. Thus, they knew about the operation system, regulation and policy, human resource management, business performance measurement and business operation strategies. That was why those people were used as a sample group to do the interview. The voluntary response sample was used in this research. The voluntary response sample was about the participants who voluntarily answered the survey. Some of the listed companies' employees were sensitive to talk about the questions about their companies, because of their working position and duty. Thus, the research only used the participants, who were free to answer questionnaires. That was why this research used a voluntary response sampling technique.

Instrument of the Study - This study's questionnaire was a self-made questionnaire which had already been passed by the ethics committee. Self-made questionnaire was created, which was more suitable for the Chinese jewelry sector. Self-made questionnaires were easier to find out the difficulties and problems in the practices. The questionnaires were made of structured questions, which were used to collect quantitative information. All the questions were referred to by academic papers and business theories. The questionnaire was tested by representative respondents to the feasibility of the questions setting. The reliability test was to assess the consistency of the objects of this research study that were identified with data records during the data collection stage. The importance of the reliability test was to ensure if the questions were replied to in the situation once it was asked on the repeated occasions. The reliability test used Cronbach Alpha to measure the reliability of the questionnaire with the benchmark of 0.7.via SPSS software. For the pre-respondents, the researcher selected a sample group of 20 individuals to conduct a reliability pilot test. Once the pilot test confirmed the reliability, the research proceeded to gather data from 529 participants to delve into the study's topic. The researcher obtained consent from all participants, assuring that their information would be kept confidential.

Table A

Reliability Summary Table – Performance of Jewelry

Indicators	Cronbach Alpha	Remarks
Performance of Jewelry Companies Instrument	.928	Excellent
Per variable		
Entrepreneurial Management Skills survey	.874	Good
conceptual skills	.728	Acceptable
technological skills	.858	Good
interpersonal Skills	.757	Acceptable
The Product Technology Innovation survey	.818	Good
Creativity	.713	Acceptable
Production efficiency	.736	Acceptable
Customization and personalization	.721	Acceptable
Business Performance survey	.846	Good
Innovation and product development	.720	Acceptable
Marketing	.758	Acceptable
Sustainability	.715	Acceptable

George and Mallery (2003) provide the following rules of thumb:"_ > .9 – Excellent, _ > .8 – Good, _ > . 7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable "

As for the content of this questionnaire, this research's questionnaire was divided into three parts, containing the entrepreneurial skills, the product technology innovation and business performance of Chinese jewelry companies. Respectively, the first part of the questionnaire was related to entrepreneurial management skills. The second part of the questionnaire was related to product innovation technology and the third part was related to business performance. The Likert questionnaire was chosen for this research. The Likert scale was used from 1 to 4 in this research. Specifically, 1 means strongly disagree.2 means disagree. 3 means agree. 4 means I strongly

agree. This questionnaire had already passed the reliability test by 20 sample tests. The results were mentioned as above.

Table A is about results of reliability tests related to the performance of jewelry companies' instruments. Based on table 1, the Performance of Jewelry companies Instrument had an excellent consistency as exhibited by the Cronbach's Alpha value of (.928). This was validated by the Good remark from entrepreneurial management skills (.874); it was confirmed by the acceptable result from conceptual skills (.7288), Good results from technological skills(.858) and Acceptable results from interpersonal skills (.757) Also, it was validated by the Good remark from the product technology innovation survey (.818); it was confirmed by the Acceptable results from Creativity (.713), production efficiency (.736), and customization and personalization(.721). It was further validated by the Good result from business performance survey (.846) ;it was confirmed by the Excellent results from Innovation and product development(.720), Sustainability (.715), and Marketing (.758); which show that the instrument at hand passed the reliability index test.

Data Gathering Procedures **-** Firstly, before collecting the data, this questionnaire underwent content validation from three experts. Three experts were from the Chinese jewelry association. Secondly, the researcher used 20 samples, as a small group, to test its reliability. The purpose of reliability was to test whether the sample actually answered the questions. This research used Cronbach's coefficient alpha (0.7) as the measurement point. Thirdly, the researcher got the agreement of HR in the jewelry companies to find the suitable participants. HR in those jewelry companies helped the researcher to persuade eligible employees to participate in this survey. In each company, research contacted the managers who were in charge of human resource management, operation management or the retailers' management in those sample companies. Those people help the research to distribute the questionnaire to their employees via online social software during the off-working time. The participants accomplished the questionnaires in confidence and voluntarily. The questionnaire respondent rate was 100%. Fourthly, actual data gathering was started by an online questionnaire. The researcher used online questionnaire tools to collect the data.

Data collection was used as an online survey tool to be realized, called Wenjuanxing online survey App. All the questionnaires were conducted online. Data collection is powered by www.wjx.cn.Wenjuanxing online survey App is a professional online questionnaire survey tool. This instrument tool is used to provide the users with various online questionnaire design, data collection and survey results This online questionnaire survey tool is the most popular one in China. Most of the participants were used to their daily working time. This professional online questionnaires survey was easier to distribute the survey and increase the answer rate. That was why the researcher chose this survey tool. Fifthly, after the data gathering process, the researcher retrieved, interpreted and analyzed the results.

Data Analysis **-** Weighted mean and rank were used to determine the entrepreneurial management skills in terms of conceptual skills, technical and interpersonal; to describe the product innovation technology as to creativity, production efficiency and customization and personalization; and to assess the business performance as to Innovation and product development marketing and sustainability. The result of the Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set was not normally distributed. Therefore, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS version 28.

Ethical Considerations **-** The research ensures that all the data collected were genuine and obtained solely for research purposes. The researchers secured consent from the participants through interviews and communication, ensuring that the target respondents were prepared to address the questions pertinent to the research. Additionally, the researchers also secured the approval of the responsible individuals from the respective companies to guarantee the authenticity of the answers provided. This investigation ensured confidentiality and privacy for the participants. All the questionnaires were online anonymous ways, which could guarantee the confidentiality and anonymity of the target participants. As for the process of ethnic clearance in

LPU, this investigation followed the university's ethics regulation. Based on the research proposal, the researchers started to design the questionnaire, and to choose the participants, and collect the data for the reliability test. After that, the researchers submitted the ethics forms to the LPU ethics committee and got approval from the ethics committee for this investigation. After that, the researchers started their real investigation, to conduct this research analysis.

3. Results and discussion

Table 1
Summary Table on Entrepreneurial Management Skills

Key Result Areas	Composite Mean	Verbal Interpretation	Rank
Conceptual Skills	2.56	Agree	1
Technological Skills	2.52	Agree	2
Interpersonal Skills	2.51	Agree	3
Composite Mean	2.53	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 1 is to summarize the results of entrepreneurial management skills in key three areas, including conceptual skills, technological skills and interpersonal skills. The Grand composite mean is 2.53. VI is "Agree". This implies that the respondents agree that conceptual skills, technological skills and interpersonal skills are significantly related to entrepreneurial management skills, and also good for improvement of Chinese jewelry companies business performance.

Conceptual skills' composite mean is 2.56, which ranks the first one among those three key result areas. The VI is "Agree". The respondents agree conceptual skills are important for entrepreneurial management skills. According to the results, the researcher thinks that conceptual skills are the basic skills for entrepreneurial management skills, because conceptual skills have a high impact on the level of creativity. This point is supported by Ramirez (2024) and Darmawan (2024). Conceptual skills affected the entrepreneurial management style, business goal, business strategy as well as companies' culture and mission (Mokbel et al., 2024). Those were the basic factors for the fashion sector's development, especially for the jewelry companies. Jewelry industry contained luxury goods, fast fashion goods, and culture and art. Furthermore, the function of jewelry products was not only related to decoration and beautification, but also jewelry products were the symbols of social status, customers' taste. Thus, jewelry core market competition was cultural marketing, which was more related to cultural identity with consumers. Zhang et al. (2024) said that building a distinctive cultural image consolidated the competitive position in the jewelry market via the cultural value of products. Ejibe et al. (2024) supported that jewelry companies' core competition was design philosophy, such as product culture, product innovation and product style. The level of creative design is highly related to conceptual skills. Shi et al., (2023) advocated that higher conceptual skills provided the innovative conceptual framework for jewelry companies to develop in China. That is why the dimension of conceptual skills ranks the first one.

Technological skills' composite mean is 2.52, ranking the second one. VI was "Agree". Also, innovative conceptual business products need to realize the conceptual ideas via advanced technique skills (Li et al., 2024). So technique skills rank second. Interpersonal skills' composite mean is 2.51, which ranks the third. Interpersonal skills are more related to human relations, but, for jewelry companies, they are more focusing on the innovative conceptual business framework than others. Interpersonal skills are more interested in human relation management. Without innovative jewelry products, even if the companies have a friendly working environment and employee relationship, the core competition of jewelry companies cannot be increased. Nagler (2024) also believed that overuse of personal skills are negative for business performance and business management. Therefore, interpersonal skills rank last one.

Table 2 is the summary table on product innovation technology. There were three key results areas, including creativity, production efficiency and customization and personalization. The composite mean is 2.49 the VI is "Disagree". The implication of research is that production innovation technology may not have a

significant impact on creativity, production efficiency and customization and personalization.

Table 2
Summary Table on Product Innovation Technology

Key Result Areas	Composite Mean	Verbal Interpretation	Rank
Creativity	2.49	Disgree	1.5
Production Efficiency	2.48	Disgree	3
Customization and Personalization	2.49	Disgree	3
Composite Mean	2.53	Disgree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Specifically, creativity and Customization and Personalization (2.49) both rank the highest. Both of their composite mean is 2.49. VI is "Disagree" and ranked 1.5. Respectively, creativity is still the core part for applying the product innovation technology, just in some aspects. That is why this indicator ranks the first one. This is also proved by Hu et al. (2024). Meanwhile, customization and personalization is not predictable and difficult to catch. That is why VI is still "Disagree". But, customization and personalization is still a trend for future jewelry business development. The sources of Wang et al. (2024) and Raban et al. (2024) prove these results. So, this may make customization and personalization ranks the first one.

Production efficiency area ranks the last one. The weight mean of production efficiency is 2.48, VI is "Disagree". The weight mean is lower than the composite mean. The rank of production efficiency is 3. Totally, creativity, product efficiency as well as customization and personalization do not have a strong relationship with the product innovation technology. But those indicators still impact product innovation technology. Scientific inventory management and 3D technology are the hard support for Chinese jewelry business development. Also, creativity of jewelry designers and experiments of innovative jewelry products are the core part for the unique and excellent jewelry works. Therefore, the jewelry companies still need to update their product innovation technology, in order to increase the level of product innovation.

Table 3
Summary Table on Business Performance

Key Result Areas	Composite Mean	Verbal Interpretation	Rank
Innovation and Product Development	2.51	Agree	0
Marketing	2.57	Agree	1
Sustainability	2.50	Agree	3
Composite Mean	2.53	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 3 is related to the summary on business performance. Three key results areas of VI are all "Agree", such as innovation and product development, marketing and sustainability. The grand composite mean was 2.53, and VI is "Agree". This means that the respondents agree with those three dimensions related to sustainability on Table 13. This implies that innovation and product development, marketing and sustainability can significantly influence the business performance of Chinese jewelry firms. Marketing area ranks first. The composite mean of marketing is 2.57. The VI of marketing is "Agree". This implies that marketability can have a strong impact on the business performance of Chinese jewelry companies. Ogundipe et al. (2024) supported that higher marketability brought positive income for Chinese jewelry companies, which was good for business performance. Stable customers' amount helped Chinese jewelry companies to have better business performance, in terms of sales turnover. The key area of innovation and product development ranks the second one. The respondents believe that innovation and product development also had relationship with business performance. The composite mean is 2.51, which is lower than the composite mean. VI of innovation and product development is "Agree".

Sustainability ranks the last one. Sustainability is significantly related to Chinese jewelry business performance. The composite mean of sustainability is 2.50. The VI is "Agree". This implies that sustainability still affects the business performance, but this is not the most important factor among those three dimensions. Some studies also agreed with this point. Based on the IFC in 2020, the sustainable development should be

disclosed as corporate sustainability reports. In order to achieve sustainability for Chinese jewelry companies, the Chinese jewelry companies invested large amounts of capital for sustainable projects, such as renewable energy, friendly working environment (Zheng et al., 2023). Furthermore, the source of Xiaowei (2024) said that Developing green jewelry businesses has led to an increased expense budget for Chinese jewelry companies, negatively affecting their cash flow in the short term. The profitability might be reduced, because of high green investment and long term payback period. As for the current Chinese jewelry business situation, based on the annual report of Chow Tai Fook (2023), the green investment payback period is around 5 to 10 years. Thus, the financial risk exists on Chinese jewelry companies, such as capital chain rupture. Capital chain rupture of jewelry companies lead to "dominos'' effect, which might bring the companies to bankruptcy, such as recent Chow Tai Fook. That was why this indicator ranks last one.

Table 4

Relationship between Entrepreneurial Management Skills and Product Innovation Technology

Variable	Rho	P-valu	Interpretation
Conceptual Skills			
Creativity	0.876**	<.001	Highly Significant
Production Efficiency	0.876**	<.001	Highly Significant
Customization and Personalization	0.864**	<.001	Highly Significant
Technological Skills			
Creativity	0.853**	<.001	Highly Significant
Production Efficiency	0.852**	<.001	Highly Significant
Customization and Personalization	0.836**	<.001	Highly Significant
Interpersonal Skills			
Creativity	0.855**	<.001	Highly Significant
Production Efficiency	0.851**	<.001	Highly Significant
Customization and Personalization	0.848**	<.001	Highly Significant

***.Correlation is significant at the 0.01 level*

As seen in table 4, the computed rho-values ranging from 0.836 to 0.876 indicate a very strong direct relationship among the sub variables of entrepreneurial management skills and product innovation technology. There was a statistically significant relationship between entrepreneurial management skills and product innovation technology because the obtained p-values were less than 0.01. Based on the results, the researcher thinks that entrepreneurial management skills can significantly affect product innovation technology, in terms of the usage of technological equipment, effective inventory management systems, and establishing effective operation system management. Conceptual skills and technological skills can realize creativity and innovation via design systems, such as 3D models. Interpersonal skills and technological skills can improve the operation efficiency. Some previous studies had the same ideas as the researcher. Based on the research of Gui et al. (2024), transformational leaders impacted on the innovation capability of firms. Transformational leadership had a clear and deep understanding of market trends, regulatory and technology advancements. The source of Joel et al. (2024) said that entrepreneurial management skills helped the leaders to bring their companies towards success, such as conceptual skills, technical and interpersonal skills. Entrepreneurial management skills form the foundation for leaders to quickly adapt to changing market dynamics and seize emerging opportunities. Besides, the research of Har et al. (2024) stated that the leaders developed entrepreneurial thinking to foster innovative thinking and encourage employees to work in the innovation environment. This supported that entrepreneurial management skills fostered creative culture and innovation working atmosphere, as soft working conditions.

As seen in Table 5, the computed rho-values ranging from 0.845 to 0.884 indicate a very strong direct relationship among the sub variables of entrepreneurial management skills and business performance. There was a statistically significant relationship between entrepreneurial management skills and business performance because the obtained p-values were less than 0.01. The results show that entrepreneurial management skills can affect the business performance of Chinese jewelry companies. High level of conceptual skills are good for setting up sustainable business strategies and clear innovative business development research plans. Good technological skills can help Chinese jewelry companies to realize their DIY business service and improve their product innovation development. Good interpersonal skills can be useful for the customers' relationship, in order

to increase Chinese jewelry companies' marketability.

Table 5
Relationship between Entrepreneurial Management Skills and Business Performance

Variable	Rho	P-valu	Interpretation
Conceptual Skills			
Innovation and Product Development	0.884**	<.001	Highly Significant
Marketing	0.863**	<.001	Highly Significant
Sustainability	0.878**	<.001	Highly Significant
Technological Skills			
Innovation and Product Development	0.863**	<.001	Highly Significant
Marketing	0.848**	<.001	Highly Significant
Sustainability	0.866**	<.001	Highly Significant
Interpersonal Skills			
Innovation and Product Development	0.862**	<.001	Highly Significant
Marketing	0.845**	<.001	Highly Significant
Sustainability	0.862**	<.001	Highly Significant

***.Correlation is significant at the 0.01 level*

Furthermore, the research of Nasher et al. (2024) agreed with this point. Wenjia (2024) said conceptual skills helped the managers to establish the entrepreneurial culture and value. Conceptual skills directed the managers to make the correct decisions for companies' visions and missions. Also, conceptual skills were useful for making the future development plan of jewelry companies. Those skills were the basis for strategic planning, future development decision-making as well as tough problem-solving.

As for innovation and creativity, conceptual skills help the leaders have keen market sense, which let the leaders to catch the changes and new opportunities. Also, the leaders who have conceptual skills can identify the risk. Those skills help the leaders to avoid the risk to ensure long-term business development. Those ideas were agreed by Berlanga et al. (2024). Ochuba et al. (2024) also supported that the high management skilled managers were more sensitive for the competitive market change, customer needs and innovative production technology. Those managers were easier to make the correct marketing business and drive innovation, and to foster sustainable growth and create value for stakeholders. Additionally, a higher level of technological skills uses innovative technology skillfully. The research of Xie et al. (2024) believed that the jewelry managers were familiar with the technological skills related to innovation and product development, marketing and sustainability. Using the innovative production technology increased the production efficiency for innovation and quality of standard jewelry products (Chen, 2024). Dai et al. (2024) pointed out that higher production efficiency reduced the carbon emission and increased the sustainable jewelry business. With a higher level of green business, the jewelry companies had positive marketability. Interpersonal skill is another element for business performance, in the aspects of innovation and product development, marketing and sustainability. The teammates increase their working communication with others. Sulistiani et al. (2024) agreed with this point. Good communication encouraged the employees to express their creative ideas and made them realized. Also, better interpersonal skills reduced the communication barriers and increased the working efficiency, in order to enhance cooperation and synergy (Sulistiani et al., 2024). Moreover, better communication among the employees built a friendly working atmosphere. The colleagues shared their working experience with each other. Also, Falander (2024) said that the working ability was improved by learning from others. Another source said that a friendly working environment increased the retention ratios of talents. Higher retention ratio of talents was good for improving their core competition for jewelry companies in China (Battiston, et al., 2024).

As seen in Table 6, the computed rho-values ranging from 0.835 to 0.859 indicate a very strong direct relationship among the sub variables of product innovation technology and business performance. There was a statistically significant relationship between entrepreneurial management skills and product innovation technology because the obtained p-values were less than 0.01. For those results, production technology innovation has a highly significant impact on the business performance, in the aspects of creativity, product efficiency as well as customization and personalization for Chinese jewelry companies. Advanced production technology can realize the designer's creative image, which is good for business product innovation and

development.

Table 6
Relationship between Product Innovation Technology and Business Performance

Variable	Rho	P-valu	Interpretation
Conceptual Skills			
Innovation and Product Development	0.858**	<.001	Highly Significant
Marketing	0.840**	<.001	Highly Significant
Sustainability	0.855**	<.001	Highly Significant
Technological Skills			
Innovation and Product Development	0.859**	<.001	Highly Significant
Marketing	0.848**	<.001	Highly Significant
Sustainability	0.848**	<.001	Highly Significant
Interpersonal Skills			
Innovation and Product Development	0.856**	<.001	Highly Significant
Marketing	0.835**	<.001	Highly Significant
Sustainability	0.849**	<.001	Highly Significant

***.Correlation is significant at the 0.01 level*

Professional production technology has functions of inventory management, marketing management and production line management. Innovative product technology can reduce inventory, increase their production efficiency, which is good for reducing carbon emission. This is good for sustainable development. Also production technology innovation can provide DIY service for clients, which is good for individualism marketing development.

For example, Huang et al. (2024) thinks that Jewelry companies care more about designers' thinking and creativity. New ideas lead a fashion trend for the jewelry sector. Creativity is important for business performance. Production technology innovation helped the designers to realize their ideas into the physical objectives, such as 3D technology. Also, production technology innovation increased the production efficiency, in both aspects of standard production business and personal production design (Ma et al, 2024). Advanced technology increases the capacity of standardized production of products, as Zong (2024) mentioned. Additionally, customization and personalization increases Chinese jewelry companies' business performance. More and more customers require unique and individual style jewelry products. High level of customization and personalization has a significant impact on Chinese jewelry companies' business competition. This is also supported by the research of Tenuta et al (2024). However, Agustia (2022) stated that technology investment cost a large amount of capital, this negatively impacted on the business performance. Technological capabilities and research and development (R&D) activities are not necessarily correlated in achieving business goals. This disconnect can increase financial risks for jewelry companies, particularly for smaller firms. Customization and personalization significantly impacts Chinese jewelry companies. By the research of Vogt et al. (2024). customization and personalization was a shortage of standard production capacity The difficult part of the current modular production line was to accurately find out how personalization impacted on the individuals' life. Therefore, this was difficult to increase product efficiency and to reduce the production cost, as well as to control the quantity for jewelry products. Totally, product technology innovation significantly influences Chinese jewelry companies' business performance, in the aspects of creativity, production efficiency, customization and personalization. Reasonable use of the production technology innovation positively impacts on Chinese jewelry companies business performance, relating to marketability, sustainability and creativity. On the contrary, production technology innovation brings some financial risks for Chinese jewelry companies, such as negative cash flow, capital chain rupture, and lower quality controlling.

Business Innovation Framework

A proposed business innovation framework for Chinese jewelry companies is provided, in order to help the business managers in Chinese jewelry companies to adjust their management control systems and their business strategies. This proposed business innovation framework may provide some useful management advice for Chinese jewelry businesses to establish an effective management control system. Also, this will provide some

suggestions for small and medium size Chinese jewelry companies to make the correct business decisions, in order to win better financial performance. Finally, this research will help the small and medium size of companies to achieve sustainable and innovative business development, in order to increase their international core competition, in the terms of entrepreneurial management skill, product innovation technology, business performance.

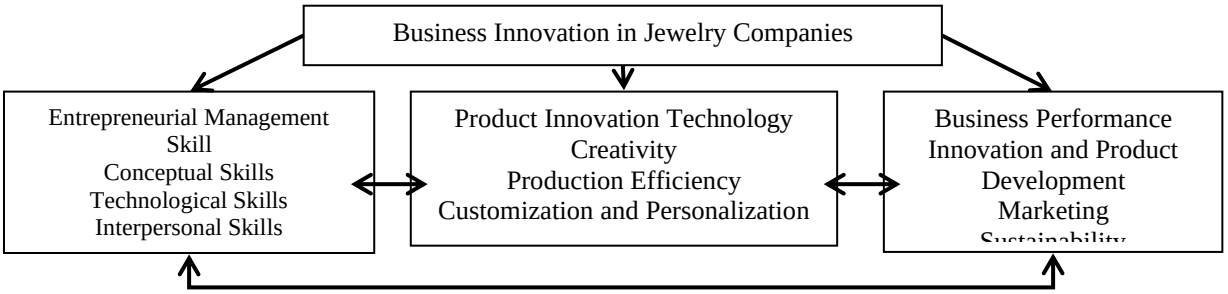

Figure 1: Business Innovation Framework for Chinese Jewelry Companies

Entrepreneurial management skill, product innovation technology, business performance. are necessary for business innovation development. Entrepreneurial management skill provides the soft support for mastering the production innovation technology and achieving the better business performance. Product innovation technology can have an impact on business innovation performance to some extent. Meanwhile, better business performance could support the development of entrepreneurial management skills and product innovation technology. This study uses some jewelry companies in China as an object in the explanation of the business innovation framework for Chinese jewelry business firms.

4. Conclusions and recommendations

The respondents generally agreed on the entrepreneurial management skills adopted in the jewelry companies as to the conceptual skills, technical and interpersonal; The respondents did not agree on the extent to which creativity, production efficiency, customization, and personalization were being used in the jewelry industry. Findings of this study revealed a general agreement among respondents regarding the business performance of jewelry companies in terms of innovation and product development, marketing, and sustainability. There is a significant relationship between entrepreneurial management skills, product innovation technology and business performance. An innovative business framework for jewelry companies was developed to provide a structured approach to help businesses in the industry improve their operations, increase profitability, and stay competitive in a dynamic market.

To enhance interpersonal skills, the HR manager may focus on effective communication, empathy, and strong relationship building which can inspire trust, build strong relationships, and drive the growth and profitability of their businesses. The top management may empower the HR managers to provide regular training to employees on new technologies, efficient techniques, and safety protocols to boost productivity and reduce errors. The production managers may promote sustainability in jewelry companies by prioritizing ethical sourcing of materials, eco-friendly production practices, and responsible waste management to contribute to a healthier planet and enhance their brand reputation. The innovative business framework may be utilized by the small and medium size jewelry companies to set up their own effective business decisions and business plan. The future researchers may investigate the role of sustainable practices in enhancing brand reputation and customer loyalty using other research locale.

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