


INTERDISCIPLINARY APPROACH TO DESIGN-LED INNOVATION FOR ECO-FRIENDLY CUSTOMER-CENTRIC CLOTHING ENTREPRENEURS

Vuthipong Roadkasamsri^A, Apiched Teekalee^B, Uthai Asana^C, Preecha Noulnim^D, Arnon Sungvondee^E, Yingfeng Li^F



ARTICLE INFO	ABSTRACT
<p>Article history: Received: December, 02nd 2023 Accepted: February, 26th 2024</p>	<p>Purpose: This article demonstrates how collaboration in a PAR and R&D research project can be facilitated by a design-led innovation process that juxtaposes design and scientific approaches.</p>
<p>Keywords: Design-Led Innovation; Interdisciplinary Collaboration; Sustainable Leftover-Based Products; Local Cultural Identity; Consumer-Centric Approach.</p>	<p>Theoretical Framework: The work was theoretically grounded in an interdisciplinary methodology and customer-centric approaches. Researchers adopted a "principles-driven" strategy as a primary guiding principle.</p> <p>Design/Method/Approach: This study utilized participatory action research (PAR) as a research methodology, emphasizing the importance of collaborations between stakeholders and the research team. The study methodology encompassed on-site visits, SWOT analysis, focus groups, and questionnaire surveys. The data obtained from all of the previously described instruments was subjected to qualitative analysis using triangulation.</p>
	<p>Findings: The study demonstrated that this approach significantly enhanced the innovation of new products and the establishment of brands by local businesses. The remaining fabric key rings of the stakeholders had an impact on the most recent clothing collection. The development of new products involved the integration of identity, traditional knowledge, and creativity with modern technology, utilizing local resources from the community for innovative transformation and business product development. By adhering to experts' recommendations, stakeholders can enhance the value of their products by demonstrating a preference for environmentally conscious, culturally significant, and artistically innovative products to the target market. The introduction of the new clothing product range received positive feedback from business owners and entrepreneurs, with an average rating of 4.71. Additionally, the annual sales value increased by 36.3%. PAR R&D facilitated the improvement of stakeholders.</p> <p>Research, Practical, and Social Implications: Creating eco-friendly apparel from fabric scraps will contribute to sustainability. Obtaining this level of sustainability requires collaboration across disciplines and design-driven innovation. In addition, this study demonstrates how a dynamic interdisciplinary innovation strategy can be effective for generating new product concepts, obtaining consumer feedback, and fostering collaboration and learning across disciplines. Lastly, this study provides</p>

^A Assistant Professor and PhD in Management. Mahasarakham University. Thailand.

E-mail: wut_ap@hotmail.com Orcid: <https://orcid.org/0009-0007-3765-4840>

^B Assistant Professor and PhD in Management. Mahasarakham University. Thailand.

E-mail: apiched.t@msu.ac.th Orcid: <https://orcid.org/0000-0001-6178-0926>

^C Assistant Professor and PhD in Management. Mahasarakham University. Thailand.

E-mail: uthai.a@msu.ac.th Orcid: <https://orcid.org/0000-0002-9962-343X>

^D Assistant Professor and PhD in Management. Mahasarakham University. Thailand.

E-mail: preecha.n@msu.ac.th Orcid: <https://orcid.org/0000-0001-6054-3232>

^E Assistant Professor and PhD in Management. Khon Kaen University. Thailand.

E-mail: sarnon@kku.ac.th Orcid: <https://orcid.org/0000-0003-1324-5747>

^F Assistant Professor and PHD in Management. Guangxi Arts University. Thailand.

E-mail: liyinfeng5@gmail.com Orcid: <https://orcid.org/0000-0003-4791-1955>

other researchers and the local industry with actionable opportunity areas and design imperatives for their sustainability-based product innovation activities.

Originality/Value: This study is the first to apply theoretical concepts to practical situations in a specific rural area to assist local community entrepreneurs lacking resources for research and development in improving their performance and outcomes, with a focus on creating product concepts that reflect the local cultural identity and incorporate innovative design principles.

Doi: <https://doi.org/10.26668/businessreview/2024.v9i3.4476>

ABORDAGEM INTERDISCIPLINAR DA INOVAÇÃO ORIENTADA POR DESIGN PARA EMPREENDEDORES DE VESTUÁRIO ECOLÓGICOS E CENTRADOS NO CLIENTE

RESUMO

Objetivo: Este artigo demonstra como a colaboração em um projeto de pesquisa de PAR e P&D pode ser facilitada por um processo de inovação orientado por design que justapõe abordagens científicas e de design.

Estrutura Teórica: O trabalho foi teoricamente fundamentado em uma metodologia interdisciplinar e em abordagens centradas no cliente. Os pesquisadores adotaram uma estratégia "orientada por princípios" como princípio orientador principal.

Projeto/Método/Abordagem: Este estudo utilizou a pesquisa-ação participativa (PAR) como metodologia de pesquisa, enfatizando a importância da colaboração entre as partes interessadas e a equipe de pesquisa. A metodologia do estudo abrangeu visitas ao local, análise SWOT, grupos de foco e pesquisas por questionário. Os dados obtidos de todos os instrumentos descritos anteriormente foram submetidos à análise qualitativa por meio de triangulação.

Conclusões: O estudo demonstrou que essa abordagem aumentou significativamente a inovação de novos produtos e o estabelecimento de marcas pelas empresas locais. Os principais anéis de tecido restantes das partes interessadas tiveram um impacto sobre a coleção de roupas mais recente. O desenvolvimento de novos produtos envolveu a integração de identidade, conhecimento tradicional e criatividade com tecnologia moderna, utilizando recursos locais da comunidade para transformação inovadora e desenvolvimento de produtos comerciais. Ao aderir às recomendações dos especialistas, as partes interessadas podem aumentar o valor de seus produtos, demonstrando ao mercado-alvo uma preferência por produtos ambientalmente conscientes, culturalmente significativos e artisticamente inovadores. A introdução da nova linha de produtos de vestuário recebeu feedback positivo dos empresários e empreendedores, com uma classificação média de 4,71. Além disso, o valor das vendas anuais aumentou em 36,3%. O PAR P&D facilitou o aprimoramento das partes interessadas.

Implicações Sociais, Práticas e de Pesquisa: A criação de roupas ecologicamente corretas a partir de restos de tecido contribuirá para a sustentabilidade. A obtenção desse nível de sustentabilidade requer colaboração entre as disciplinas e inovação orientada pelo design. Além disso, este estudo demonstra como uma estratégia dinâmica de inovação interdisciplinar pode ser eficaz para gerar novos conceitos de produtos, obter feedback do consumidor e promover a colaboração e o aprendizado entre as disciplinas. Por fim, este estudo oferece a outros pesquisadores e ao setor local áreas de oportunidade acionáveis e imperativos de design para suas atividades de inovação de produtos com base na sustentabilidade.

Originalidade/Valor: Este estudo é o primeiro a aplicar conceitos teóricos a situações práticas em uma área rural específica para ajudar os empresários da comunidade local que não dispõem de recursos para pesquisa e desenvolvimento a melhorar seu desempenho e seus resultados, com foco na criação de conceitos de produtos que reflitam a identidade cultural local e incorporem princípios de design inovadores.

Palavras-chave: Inovação Orientada pelo Design, Colaboração Interdisciplinar, Produtos Sustentáveis Baseados em Sobras de Alimentos, Identidade Cultural Local, Abordagem Centrada no Consumidor.

ENFOQUE INTERDISCIPLINAR DE LA INNOVACIÓN BASADA EN EL DISEÑO PARA EMPRESARIOS DE LA CONFECCIÓN ECOLÓGICOS Y CENTRADOS EN EL CLIENTE

RESUMEN

Propósito: Este artículo demuestra cómo puede facilitarse la colaboración en un proyecto de investigación de I+D y PAR mediante un proceso de innovación dirigido por el diseño que yuxtapone enfoques científicos y de diseño.

Marco Teórico: El trabajo se basó teóricamente en una metodología interdisciplinar y en planteamientos centrados en el cliente. Los investigadores adoptaron como principio rector una estrategia "basada en principios".

Diseño/Método/Enfoque: Este estudio utilizó la investigación-acción participativa (IAP) como metodología de investigación, haciendo hincapié en la importancia de la colaboración entre las partes interesadas y el equipo de investigación. La metodología del estudio abarcó visitas in situ, análisis DAFO, grupos de discusión y encuestas con cuestionarios. Los datos obtenidos de todos los instrumentos descritos se sometieron a un análisis cualitativo mediante triangulación.

Resultados: El estudio demostró que este enfoque mejoró significativamente la innovación de nuevos productos y el establecimiento de marcas por parte de las empresas locales. Los restantes llaveros textiles de las partes interesadas repercutieron en la colección de ropa más reciente. El desarrollo de nuevos productos supuso la integración de la identidad, el conocimiento tradicional y la creatividad con la tecnología moderna, utilizando los recursos locales de la comunidad para la transformación innovadora y el desarrollo de productos empresariales. Siguiendo las recomendaciones de los expertos, las partes interesadas pueden aumentar el valor de sus productos demostrando al mercado destinatario su preferencia por productos respetuosos con el medio ambiente, culturalmente significativos y artísticamente innovadores. La introducción de la nueva gama de productos de confección recibió una valoración positiva por parte de empresarios y emprendedores, con una nota media de 4,71. Además, el valor de las ventas anuales aumentó un 36,3%. La I+D de PAR facilitó la mejora de las partes interesadas.

Investigación, Implicaciones Prácticas y Sociales: La creación de prendas ecológicas a partir de retales de tela contribuirá a la sostenibilidad. Obtener este nivel de sostenibilidad requiere la colaboración entre disciplinas y la innovación impulsada por el diseño. Además, este estudio demuestra cómo una estrategia dinámica de innovación interdisciplinaria puede ser eficaz para generar nuevos conceptos de producto, obtener opiniones de los consumidores y fomentar la colaboración y el aprendizaje entre disciplinas. Por último, este estudio proporciona a otros investigadores y a la industria local áreas de oportunidad procesables e imperativos de diseño para sus actividades de innovación de productos basadas en la sostenibilidad.

Originalidad/Valor: Este estudio es el primero que aplica conceptos teóricos a situaciones prácticas en una zona rural concreta para ayudar a los empresarios de la comunidad local que carecen de recursos para la investigación y el desarrollo a mejorar su rendimiento y sus resultados, centrándose en la creación de conceptos de producto que reflejen la identidad cultural local e incorporen principios de diseño innovadores.

Palabras clave: Innovación Impulsada por el Diseño, Colaboración Interdisciplinaria, Productos Sostenibles Basados en Sobras, Identidad Cultural Local, Enfoque Centrado en el Consumidor.

1 INTRODUCTION

Interdisciplinary collaboration is required to resolve the most critical socio-innovation issues on a local scale. However, researchers in the field of local product development are typically driven by their own productivity and academic peer recognition. Due to working and thinking in silos, such projects may not be fully utilized in order to jointly produce insights that are pertinent for users (consumers, businesses, and other researchers). In recent years, the design discipline has evolved to play a significant role in resolving such difficult challenges when consumers, researchers, and designers engage in a co-creative and collaborative process. McCann (2023), for instance, promotes a collaborative design process by bringing together all stakeholders from academia and industry to engage with end users in order to identify and address their actual requirements. Working within this multidisciplinary sector, a product development team must also interrogate and address sustainable and ethical considerations throughout the collaborative design research and development process.

Numerous studies (e.g., Gonera and Pabst, 2019; Micheli et al., 2019; Secundo et al., 2020) indicate that design may have a significant positive impact on research and innovation

initiatives. For example, design can raise user focus and insight generation, facilitate collaboration, improve visualization, make research results real, and increase the focus on solutions and innovations. According to Ben Mahmoud-Jouini et al. (2016), long-standing research has shown that conventional project management methods are inadequate for dealing with environmental or business demands that change, particularly in novel situations marked by complexity and ambiguity. In such a situation, a project becomes a process for formulating strategies as opposed to being concerned with the effective implementation of a planned approach. As a result, controlling the exploratory stage, including stakeholders in the project, and managing the project in relation to the firm's strategic planning process become three imperatives for project management. We suggest that design thinking, a more recent development in the field of design, can significantly advance these imperatives. Practitioners and academics alike have emphasized design thinking as a cutting-edge methodology that has the potential to be helpful for enhancing innovative results, whether they are goods, services, or strategies.

Applying design to innovation projects has also been shown to lead to product concepts with higher performances and outcomes, creating a pragmatist theory of practice to (re)introduce sensibility through design thinking (Rylander et al., 2022); critical analysis, and the future evolution of design thinking (Verganti et al., 2021); a design method for the birth and growth of entrepreneurial prospects is called "entrepreneurship as design" (Magistretti et al., 2023); business model dynamics testing by entrepreneurs: current knowledge and potential futures (Sanasi, 2023); internal communication in R&D: expert-based decision-making processes (Zemlickienė et al., 2022); artistic consideration: boosting the 'R' in R&D (Robbins & Sandberg, 2023). As with scientists, designers frequently conduct surveys, employ ethnographic research, and analyze the results statistically. Although there is a natural connection between ethnography and cross-cultural pragmatics, this connection has not been thoroughly investigated. Some researchers seek to clarify the underlying assumptions of ethnography and propose ways in which issues in cross-cultural pragmatics (CCP) can be approached from an ethnographic standpoint. To illustrate this, Davis and Henze (1998) examined the underlying philosophy, objectives, and methods of ethnographic work. Then, they present two examples of how an ethnographer examines CCP issues, namely second language education and cross-cultural communication in the workplace. Finally, they provide recommendations for how CCP researchers can best integrate ethnographic methods into their work.

Design as a practice evolved from the arts and crafts, and it is perpetually formalized in a variety of contexts. The significance of the study of has been the subject of much inquiry, including: promoting design learning in the humanist era (Noël, 2020), the post-industrial legacy in Brazil: the design intersection of circular economy principles and collective urban practices (Nogueira & Wallig, 2022), design-driven innovation for more plant-based foods: An interdisciplinary strategy for more consumer-centric product development (Gonera et al., 2023), supplier resiliency during the COVID-19 crisis in the apparel global value chain (GVC): the influence of GVC governance and supplier upgrading (Choksy et al., 2022), a procurement and supply management perspective on supply resilience for improved emergency response (Kähkönen & Patrucco, 2022), the implications of incumbents and business model innovation for the sustainability of the sharing economy (Ciulli & Kolk, 2019), the enhancement of subsidiary capabilities by emerging market acquirers (He et al., 2018), and inverted world: entrepreneurial decline, its recalcitrant myths, and disquieting facts (Cooke, 2019).

Customer-centric approaches (like design) in research and innovation are becoming more and more popular since they enable researchers to create solutions that can enhance people's lives as well as identify trends and behaviors (Fenko & van Rompay 2018; Schifferstein 2015). One key factor in consumer-centric approaches is understanding customers' decisions. Customers make decisions based on extrinsic characteristics (such as brand, packaging, price, labeling, and claims) rather than intrinsic product knowledge (sensory features). They glean information from the on-pack communication regarding the nature of the product, nutritional and health considerations, social responsibility, etc. (Symmank, 2019). In order to differentiate products in the market and possibly encourage customers to make more environmentally friendly decisions, packaging and its design are essential components of the marketing mix (Nocella & Kennedy, 2012). Extensive research (e.g., Asioli et al., 2017; Giovannetti et al., 2022; Cardinali et al., 2023; Mody & Wheeler, 1987; Gil-Pérez et al., 2020) has been done on the significance of studying extrinsic cues in customer decision-making to provide an overview of methodologies in sensory and customer science.

It is evident that the findings of the aforementioned studies yield both academic and practical contributions. However, the application of theory to practice in rural areas where local community entrepreneurs truly need help for research and development to improve their products or services, performances, and outcomes is scanty. Scantier is the integration of ideas and innovations, the collaboration of various parties involved in design development from the arts and crafts in response to customers' demands. To verify the contributions, this study,

therefore, practically applied the theory to practice in a selected rural area (namely Na Mo Ma Subdistrict, Mueang Amnat Charoen District, Amnat Charoen Province, Thailand) with the following research question: To what extent can new products be developed by applying interdisciplinary and customer-centric approaches in innovation and collaboration projects to create product concepts based on local cultural identity and innovative design as a practice evolved from the arts and crafts with the goal of enhancing local community entrepreneurs' higher performances and outcomes?

2 RESEARCH OBJECTIVE

This research aims to develop new products by applying an interdisciplinary and customer-centric approach to innovation and collaboration projects to create product concepts based on local cultural identity and innovative design as a practice evolved from the arts and crafts with the goal of enhancing local community entrepreneurs' higher performances and outcomes.

To achieve the research objective, the research method was designed as shown in the next part.

3 RESEARCH METHOD

3.1 RESEARCH DESIGN

This qualitative study employed a research and development (R&D) project that aimed to enhance the performances and outcomes of local community members in Na Mo Ma Subdistrict, Mueang Amnat Charoen District, Amnat Charoen Province, Thailand. The community was purposefully selected for this applied study because it was funded by the Industrial Promotion Center, Region 7, Department of Industrial Promotion, Thailand. The fund aimed to increase community economic potential for fiscal year 2023 by creating and integrating local wisdom and identity to add value to local products.

To achieve this, participatory action research, or PAR, was chosen as a research approach for these reasons. The research team prioritizes partnerships on an equal basis with the research team. This research also required the active participation and involvement of local stakeholders (including, community members and practitioners), such as local community members as participants in this study, researchers as representatives of the academic sector, entrepreneurs as representatives of the business and professional sectors, and project administrators as representatives of funders. The participation of the stakeholders relied on a

process of collective, self-reflective inquiry, which they conducted in an effort to comprehend and enhance the practices and circumstances in which they were engaged. This process is linked to action, which, ideally, will result in affected individuals or communities having greater control over their productive activity and creativity (Baum, MacDougall, & Smith, 2006). PAR is, therefore, compatible with the research objectives than other action research terms closely related to PAR (namely, participatory appraisal, rapid appraisal, participatory learning and action, community-based participatory research, co-operative/collaborative enquiry, participatory learning research, reciprocal research, critical action research, empowerment research, participant observation, emancipatory research, action learning, contextual action research, action science, soft-systems approaches, and industrial action research) (Appel, Buckingham, Jodoin, & Roth, 2012; Bergold & Thomas, 2012; Kemmis & McTaggart, 2007; Land and Water Australia, 2009; Pain, Whitman, Milledge, & Lune Rivers Trust, 2011) because these models are frequently characterized by an unequal relationship between researchers and participants (Baum et al., 2006). According to Boyle (2012) and Patton (2008), PAR is more than a research method; it is an approach to research that seeks to make participants equal partners with the researcher (Pain, Whitman, Milledge, & Lune Rivers Trust, 2011).

3.2 PROCESS OF DEVELOPMENT

In line with the PAR, the process of development in this study can be illustrated in Figure 1.

Figure 1

Research Process



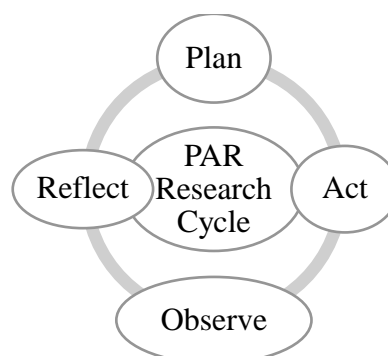
(Adapted from Department of Health and Human Services (DHHS), 2012, p. 7).

Figure 1 illustrates the research process of this study, showing how these cycles are repeated to allow for incremental changes to the project over time. The increasing size of the cycles reflects an increase in focus, impact, and the questions driving them; each cycle allows more stakeholders to be drawn into the process. In line with the PAR approach's emphasis on providing these action research and development services, the process of this research centered on the significance of using effective and accurate information to make decisions that will improve local community members' performance, production, practices, and processes in order to deliver high-quality products that are responsive to customers' satisfaction and result in better outcomes for stakeholders.

It is the researchers' responsibility to improve action research and development service delivery through PAR, which frequently necessitates teamwork for problem-solving, data collection, and conclusion-making (Alston & Bowles, 2003; Owen, 2006). The responsibilities include assisting participants with the PAR process and making sure they are prepared to participate in each stage of the evaluation (Schwandt & Burgon, 2006). The stages of the PAR cycle include these tasks: plan, act, observe, and reflect (DHHS, 2012; Kindon, Pain, & Kesby, 2007). These actions combine to generate a continuous quality improvement process, as shown in Figure 2.

Figure 2

PAR Research Cycle



(Adapted from DHHS, 2012, p. 8).

Figure 2 illustrates the PAR research cycle employed in this study. The four basic principles are: plan, act, observe, and reflect. Each principle was detailed during each site visit.

Although this illustrates the procedure, there is not just one way to perform PAR research. There are a variety of methodologies that can be employed, and which one is best depends on the assessment context, the requirements of the clients, the needs of the larger community, and the

particular circumstances in which the programs are provided (Kindon et al., 2007). Participants are consulted when choosing which research tools to utilize, such as surveys, interviews, focus groups, and observation (Kindon et al., 2007), as shown in the next part.

3.3 INSTRUMENTS FOR DATA ELICITATION

The "principles-driven" approach to research known as PAR aims to produce better results for the community and higher-quality research that is sensitive to client satisfaction. These PAR guiding principles can also help researchers select research methodologies and equipment that best meet the demands of all stakeholders. Research techniques and tools include the following: site visits, SWOT analysis, focus groups, and questionnaire surveys.

3.3.1 Site Surveys

The site visits to Ban Na Mo Ma Community Enterprise, Village No. 1, and Village No. 7, Amnat Charoen Province, Thailand, consisted of three visits in line with the PAR research cycle. Below are the details of each visit. The first visit, or planning, aimed to draw on the background knowledge of the feasibility of product development and the entrepreneurial community members who were the participants in this study to clarify details of the project implementation framework and management through a SWOT analysis. Before implementing the PAR approach, the researchers set up the prerequisites for participants to: acknowledge the importance of local knowledge; accept and own research findings; be willing to participate in all stages of the research; be willing to include a wide range of participants; and choose research methods that are appropriate for the situation and that communities or groups can learn to use without outside assistance.

The second one, or acting and observing, aimed to implement and formulate product development strategies and guidelines to develop new quality products, add value to their products, and create product identity in response to market demands. An overall action plan was initiated. In the overall action plan, activities from the beginning to the end were created to guide the operation of the project. The plan involved the following product development activities: product design, knowledge transfer, giving advice, and product demonstration. In details, the activities focused on creating new product concepts by adopting the identity of local wisdom, integrating innovation and contemporary technology, utilizing the community's primary natural materials as a factor in the creative transformation and business product

development process, identifying product distinctions, and combining branding with packaging and storytelling to create added value for community products.

The last one, or reflection, aimed to give advice on product evaluation. A panel of experts analyzed the data, development possibilities, new product development, and design guidelines. A conceptual framework for product design and development was offered to operators to discuss and exchange until reaching a conclusion. A panel of experts provides advice on developing and defining a clear theme concept that is ready to lead to design and production. Product design, or sketch design, involves selecting outstanding ideas from at least two unique styles or fields of products and analyzing market feasibility, including establishing a plan to connect the consumer business group or target partners in the production and development of prototype products with a panel of experts.

3.3.2 SWOT Analysis

This analysis involves the strengths, weaknesses, opportunities, and threats of the product before development.

3.3.3 Focus Groups

The focus groups consisted of the following: knowledge transfer, product designs, advice on the developed products, and contributions of the PAR R&D project to stakeholders.

The knowledge transfer was intended to inspire locals to generate their own income, with a focus on emphasizing competition and economic expansion by these methods: identifying the preferences of prospective consumers; creating new product concepts by incorporating cultural identity, local wisdom, and colloquial culture; combining innovation and modern technology with the community's primary natural materials as a factor in the creative transformation and business product development process. All these aimed to identify product distinctions and merge with branding in order to create branding, packaging, and narratives, which are mechanisms for adding value to community products and for creating and raising the identity of their own community to national and international standards.

The product design involved these activities, defining themes and weaving them together into a holistic concept, sketching designs by selecting from outstanding concepts, and formulating a plan to connect the entrepreneurs to potential consumers, business groups, and target partners.

The panels of experts gave advice on the newly developed products. The advice involved product samples, product improvement, and guidelines for bringing product samples into commercial production.

The contributions of the PAR to stakeholders engaged with the benefits and limitations of PAR. As a principles-driven approach, PAR is built upon these factors: social change, participation, empowerment, and collaboration. The focus group, therefore, drew insights from the four principle-driven factors.

3.3.4 Questionnaire Surveys

The surveys focused on the outcomes, including the contributions of the project to the stakeholders in terms of the quality responsive to customers' satisfaction and business. On one side, the customers' satisfaction consisted of these issues: sufficiency of the information supplied; talents, knowledge, and abilities of consultants; consultants' intent and attention to the transmission of knowledge to participants; facilitation and swiftness of procedures; provision of services to participants with courtesy, tenacity, and care; punctuality of the service deadlines; appropriateness of service location; and availability of service-related instruments, records, and equipment. On the other side are these business contributions: cost of production, price, monthly sales value, annual sales value, increased sales of developed products, and increase in sales.

3.4 DATA ANALYSIS

The data drawn from all aforementioned instruments were qualitatively analyzed to explain the R&D process's higher outcomes based on triangulation. For reliability and validity checks, five experts in this field evaluated the questionnaires, and alterations were made based on their recommendations. The Alpha Cronbach test was used to confirm the questionnaires' dependability. The value of 0.80 is solid and reliable. The levels of questionnaire satisfaction were categorized as follows: lowest (1.00–1.50), low (average 1.51–2.50), moderate (2.51–3.50), high (average 3.51–4.50), and maximum (average 4.51–5.00). The results of the data analysis are shown in the next part.

4 RESULTS OF THE STUDY

In response to the research question, the results of the analysis were as follows:

4.1 THE RAW MATERIALS, THE CRAFTS, AND THE IDENTITY

The results of the site visit revealed that reeds as materials and the Na Mo Ma people have a tight relationship. Beginning in 2000, with the introduction of locally accessible raw materials for the creation of reed mats, patterns were developed in collaboration with the OTOP Group, a producer of floor mats made of processed reed. A medium-sized fashion bag-style travel bag constructed of reed mats that was inspired by regional knowledge The item has a recognizable pattern. earned numerous honors and was acknowledged by government standards. To spread the market to other nations in the future, Baan Na Mo Ma has been established as a conservation tourist destination. The organization aims to create items that make a difference, are modern, and can be sold nationwide. In addition, a town with unique arts and culture that were passed down from long-ago ancestors is called a "homestay town". For those who have been, there are cultural attractions that are particularly noteworthy, as shown in Figure 3.

Figure 3

Baan Na Mo Ma and Its Products and Conservation-Related Tourist Attractions



Source: Prepared by Authors (2024)

Figure 3 illustrates Baan Na Mo Ma and its conservation-related tourist attractions. Horses, or Ma in Thai, are the key historical and cultural symbols of the community, which was named after them as “Baan Na Mo Ma.” The community has planned cultural road activities, which include routes that concretely reflect the specific local cultural identity in terms of dress and plainly demonstrate local identity. There have been historic structures for ages. The Old Ancient Site of Lan Sema Dong, including the Thai Culture. The neighborhood has produced

goods and homestay services. It is noted that the products show neither logos nor horses, or Ma, which are the key historical and cultural symbols of the community.

To develop their products effectively, the research team conducted a SWOT analysis. The research resulted in the development of new product concepts, as shown in the next part.

4.2 STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS OF THE ORIGINAL PRODUCTS

The site visit also aimed at conducting a SWOT analysis of the community's products through a focus group, as shown in Figure 4.

Figure 4

SWOT Analysis of the Original Products



Source: Prepared by Authors (2024)

Figure 4 illustrates the SWOT analysis of the original products. The focus group (including stakeholders, design experts, and research teams) indicated these key insights. The community contains these strengths: (1) sufficient supplies are on hand to produce locally and cut expenses, and resources like fabric or fabric scraps can be acquired from communities outside of a network; (2) the making and pounding of mats that have been passed down through generations has benefited from community wisdom; and (3) it is a popular tourist destination, constantly used by tourists. However, the community contains these weaknesses. There are these lacks: (1) innovative product designs that can compete in the market; (2) memorable branding, logos, and product labels, and; (3) sustainable means of distribution. The community has these opportunities. Both Thais and foreigners enjoy using environmentally friendly products made of natural materials. Also, there are government organizations to support. Finally, there is a network of businesses that manufacture hand-woven fabrics to produce materials in close proximity to increase output. Marketing, as well as a lack of logos and packaging, are major threats to their products.

In short, with the strength of the business, there are reed materials. And fabrics for the production of enough to help reduce production costs. The leader of the group is a new generation, ready to learn and develop. It is an important cost that will lead to development in various aspects of the business, especially in terms of product diversity. A significant shortcoming of the project is the inclusion of new product models to compete in the market. Flaws were evident in these issues with branding, logos, and product labels that will stick in the minds of buyers. Due to the popularity of Thai consumers and foreigners who favor environmentally friendly products, it is a job that needs professionals to assist in the development of the product. There is a network of hand-woven fabric producers and natural materials in production that is close enough to be prepared for production growth. Also, there are other similar rivals in the industry. Online product sales still require a lot of learning for the community.

Drawing upon the insights from the site visit above, the research team then formulated a development plan in response to the results of the SWOT analysis and the community's raw material potential and cultural identity.

4.3 DEVELOPING NEW PRODUCT DESIGN

This project developed several products (namely food, drinks, clothing, decoration items, souvenirs, and bags). To be practical, this paper purposefully focused on the clothing collection (e.g., hats and trousers) as well as the logo and packaging design for the product. The community's original product made from scrap fabrics is shown in Figure 5.

Figure 5

The community's original product



Source: Prepared by Authors (2024)

Figure 5 illustrates the community's original product: the key rings. As the community lacked a direct weaving group, the task that they undertook was to create key rings out of leftover cloth from processing.

Although the residents of the community were extending product development to promote tourism in the Baan Na Mo Ma community and developing products for new markets, they still did not see what their product destination would entail. The research team therefore provided examples of other enterprises that could develop a model for local products to become premium products, both with regard to product development concepts and the utilization of cultural identity in premium products, as shown in Figure 6.

Figure 6

Developed Prototypes of Other Enterprises (Mantra Crafts., n.d.)



Figure 6 illustrates developed prototypes of other enterprises that foreshadow what the members of the Baan Na Mo Ma community would extract from their developed product destinations.

In line with proposing samples, a focus group on knowledge transfer was conducted to provide additional data for new design concepts, logo design, and package design, as described in the next part.

4.4 KNOWLEDGE TRANSFER OF INNOVATIONS

The knowledge transfer of new developing concepts is shown in Figure 7.

Figure 7

Knowledge Transfer



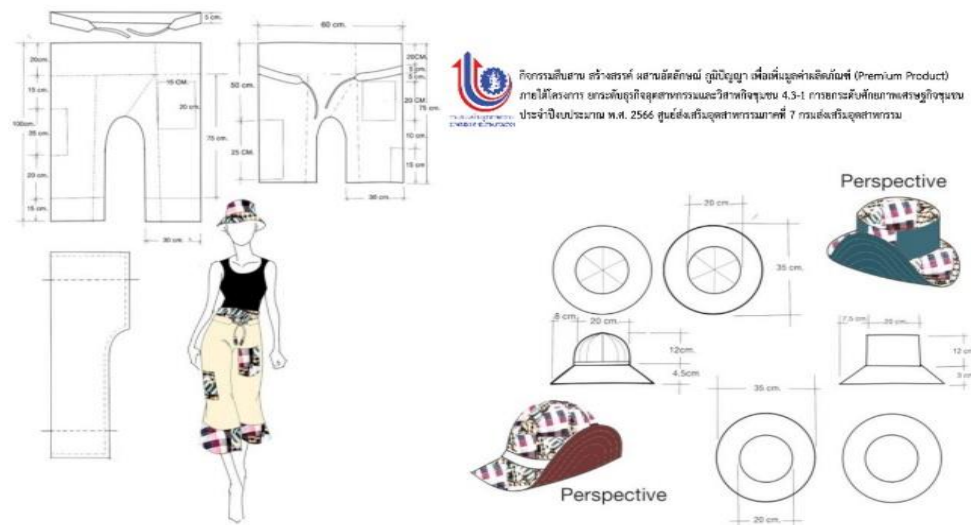
Source: Prepared by Authors (2024)

Figure 7 illustrates the knowledge transfer of new design concepts, logo design, package design, and branding. The transfer also provided the application of in-depth counsel on inheritance, creativity, integration of identity, and local wisdom to the target group of Na Mo Ma Community Enterprise in order for the target enterprise and its members to compete and grow through research into the preferences of target consumers. The knowledge transfer intends to complete the following activities:

- a) Developing novel product ideas by fusing innovation with modern technology (such as sewing and quilt knitting) and traditional wisdom to identify vernacular culture by using the primary resources available in the neighborhood in the process of creative transformation and the production of commercial products;
- b) Identifying product variations, packaging, and storytelling are created when branding is combined with them (branding, packaging, and storytelling), and this process adds value to local products to develop a sense of community and adhere to criteria approved by the target audience;
- c) Creating a theme concept, a comprehensive notion, to tie the same story together, starting with the goods produced by the local community and imaginative do-it-yourself activities that allow visitors to take part in the manufacturing process and appreciate the value of the developed products;
- d) Creating a sketch design by picking the best ideas out of two distinct product categories or styles and considering the viability of the market, as shown in Figure 8.

Figure 8

Sketch Designs



Source: Prepared by Authors (2024)

Figure 8 illustrates a sketch of the developed product design. The products (namely, hats and trousers) were made from scrap fabrics in line with the circular economy concept. The product incorporates the community capital; bearing the brand stresses the creation of products that combine the conventional knowledge of the community and the link between reeds and contemporary product designs, the concept of creating modern goods in response to modern lifestyles. In terms of cultural capital and assets, the fabric scraps were obtained from the network community's processing of discarded fabrics. In terms of innovation and modern technology, quilts and new sewing patterns were introduced to the community. In terms of marketing communication, storytelling of the community's history under the theme of "Conserving the World" was adopted as a marketing tactic and branding strategy aimed at environmentally conscious customers. The material creates a sustainable selling point through its involvement in environmental preservation. In terms of a business's resilience, there are sufficient natural materials (i.e., reed) and fabrics for production to reduce production costs, and a network of nearby hand-woven fabric manufacturers to increase production. Entrepreneurial producers possess fundamental sewing skills, the required tools, and a willingness to learn and develop, which are significant qualities that can lead to expansion in several aspects of the business, including product variety and the introduction of new product models. However, the lack of branding, insignia, and product labels, the large number of similar competitors on the market, and the entrepreneurs' lack of expertise in selling products online were identified as the primary weaknesses. The capacity to accommodate Thai and international

consumers' preferences for environmentally friendly products. The sketches were then developed into products, as shown in Figure 9.

Figure 9

Development from Sketches into Products



Source: Prepared by Authors (2024)

Figure 9 illustrates the development of sketches into products. In this process, the expert team made suggestions for adjustments to the prototypes. When stitching, it is essential to pay close attention to the smallest of details. Selecting a thread color that complements the color of the fabric, embroidery, concealing the thread, evenly spacing the bag's components, such as the location of the strap's attachment, etc. On branding, there is no symbol to connect the community's history with the narrative of the product. Such a symbol must be prominent and proportionate. Also, there are two suggestions for the future. On colors, harmony should be considered when selecting the fabric. Even if it is a piece of cloth left over from the sewing of a network business, a management system is utilized, for instance, when a piece of cloth is obtained to be stored separately by color groups or dyed with mud or natural colors to give it an earthy tone to make the workpiece appear more harmonious and pleasing to the eyes. On sizes, the S, M, L, and XL sizing system for ready-to-wear garments should be used to provide a variety of sizes suitable for consumers of all ages, genders, and body types.

Improvements were made to stitching and branding in response to the recommendations of the experts. Modifications were made to the collection of embroidery details, threading, and color harmony during stitching. As a result of devising horse-shaped dolls from scraps of cloth, which demonstrate the identity of the community, and patchwork on the trousers, there is an increase in the clarity of the distinctiveness and identity of the community in terms of branding. The horse is the focal point and is sized and proportioned appropriately. Additionally, some

embellishments were added to make the product distinctive and appealing. The complete products are shown in Figure 10.

Figure 10

The Recently Created Clothing Product Collection



Source: Prepared by Authors (2024)

Figure 10 illustrates the newly developed clothing product collection. The newly designed apparel collection and logo packaging were initiated. The design and pattern of a quilt were chosen on purpose as a concept for product development. In accordance with the circular economy and zero-waste principles, the initial materials were scraps of fabric left over from the fabric processing procedure. Also, the design and pattern of quilts can attract the attention of new-generation markets because they are unique and impart a distinct appearance to each piece. These generations favor purchasing products that are environmentally conscious, creatively expressive of aesthetic sensibilities, and promote cultural values. Lastly, the community members have expertise in sewing. To promote tourism in the Na Mo Ma community, the pattern work is sewn onto hats, trousers, and a variety of other accessories using loincloth and plain fabric. The focus of marketing communications will be "Thai Horse Saves the World," conveying to the target market that they prefer purchasing environmentally responsible products that promote cultural values and demonstrate aesthetic sensibilities creatively.

Having completed this stage, newly designed products and initiated packages were presented to businesses and entrepreneurs, as shown in the next part.

4.5 PRODUCT EVALUATIONS AND CONTRIBUTIONS TO STAKEHOLDERS

The business and entrepreneurs considered the newly designed products and initiated packages, as shown in Figure 11.

Figure 11

Business and Entrepreneurs' Evaluations of the Products



Source: Prepared by Authors (2024)

Figure 11 illustrates business and entrepreneurs' evaluations of the products. The results of their evaluations are shown in Table 1.

Table 1

Business and entrepreneurs' evaluations of the products

Items of Evaluation	Mean	SD	Level of Satisfaction
Sophistication	4.25	0.33	High
Interestingness/uniqueness	4.50	0.27	High
Suitability of materials	4.75	0.33	Highest
Market potentials	5.00	0.45	Highest
Form of packaging	5.00	0.45	Highest
Packaging information for communication	4.75	0.33	Highest
The product offering exceptional value	4.75	0.33	Highest
Total	4.71	0.31	Highest

Source: Prepared by Authors (2024)

Table 1 presents the mean scores of the business and entrepreneurs' evaluations of the newly developed clothing product collection. The overall mean score was 4.71, indicating the highest level of satisfaction. The results of each item were arranged from the highest to the lowest as follows: market potentials ($\bar{x} = 5.00$), form of packaging ($\bar{x} = 5.00$), suitability of materials ($\bar{x} = 4.75$), packaging information for communication ($\bar{x} = 4.75$), the product offering exceptional value ($\bar{x} = 4.75$), interestingness/uniqueness ($\bar{x} = 4.50$), and sophistication ($\bar{x} = 4.25$) respectively. This indicates that, overall, the respondents were satisfied with the newly developed clothing product collection at the highest level.

In terms of business, the financial contributions of the newly developed clothing product collection to the stakeholders can be summarized, as shows in Table 2.

Table 2

Financial contributions to the stakeholders

Items	Product Value	
	Before the Project (THB)	After the Project (THB)
Cost of production	210	285
Price	350	550
Monthly sales value	7,000	11,000
Annual sales value	84,000	132,000
Total increased value of the developed products (per year)		48,000

Source: Prepared by Authors (2024)

the financial contributions to the stakeholders. The increased value of the developed Table 2 presents products (per year) is 48,000 THB, which equals a 36.3% increase in sales.

To increase the sales value of the newly developed clothing product collection in this initial phase of the project, it is essential to provide insights into the contributions of this PAR R&D project to the stakeholders for further development in the next phase of the project or for their own self-development. The results of the focus group after this project revealed that the stakeholders gained these contributions: an increase in productivity and decrease in frustration, an increase in partnerships and trust; action plans pertinent to the stakeholders' problem solving; empowering the community and building community capacity, engaging the community; planning for and raising awareness of impending change; gaining access to specialized local knowledge, an increase in profundity and comprehension of issues that makes research more pertinent; and an increase in the likelihood of community adoption of innovative practices and findings.

5 CONCLUSION AND DISCUSSION

5.1 CONCLUSION

This study aimed to answer this research question: to what extent can new products be developed by applying interdisciplinary and customer-centric approaches in innovation and collaboration projects to create product concepts based on local cultural identity and innovative design as a practice evolved from the arts and crafts with the goal of enhancing local community entrepreneurs' higher performances and outcomes? To answer this research question, the research strategy of participatory action research (PAR) was chosen, as this study prioritizes partnerships between stakeholders and the research team. The research instruments include site visits, SWOT analysis, focus groups, and questionnaire surveys. The data collected from all of the aforementioned instruments was qualitatively analyzed based on triangulation.

The results of the study revealed that this project enhanced the performances and outcomes of local community members in Na Mo Ma Subdistrict, Mueang Amnat Charoen District, Amnat Charoen Province, Thailand, in two aspects: new product creation and branding. The newly developed clothing product collection was modified from the stakeholders' original product of key rings made from scrap fabrics. Despite using the same raw materials, the newly designed products were conceptualized and created by bringing identity, traditional wisdom, and innovation together with modern technology by using the main raw materials in the community as a factor in the process of creative transformation and business product development. By following the experts' advice, the stakeholders could create all the added values for their products (namely, quality, identity, storytelling, branding, and packaging), which conveys to the target market that they prefer purchasing environmentally responsible products that promote cultural values and demonstrate aesthetic sensibilities creatively. The product evaluation revealed that the business and entrepreneurs were highly satisfied with the newly developed clothing product collection, with an overall mean score of 4.71 and an increased annual value of 36.3 % in sales. This PAR R&D project contributed to the stakeholders' further development and self-development.

5.2 DISCUSSION

The findings of this present study have similarities and differences with those of prior studies in these aspects. First, this study is consistent with the prior study that interdisciplinary collaboration provides solutions to local socio-innovation concerns, especially design approaches. For example, McCann (2023) fosters a collaborative design approach by bringing together academia and industry stakeholders to interact with end users to discover and answer their needs. Like McCann's study, this present study relies on a collaborative product development team to guide an interdisciplinary and customer-centric approaches to innovation and collaboration to create product concepts based on local cultural identity and innovative design.

In addition, this present study shares similarities with several studies (Gonera and Pabst, 2019; Micheli et al., 2019; Secundo et al., 2020) that suggest design may boost research and innovation. For instance, according to Ben Mahmoud-Jouini et al. (2016), long-standing research is effective for handling environmental or business demand changes. However, this present study found that long-standing research, like a pilot project, is effective for handling changes.

Several studies indicate that design offers considerable contributions to development, such as a sensible introduction to innovation (Rylander et al., 2022), entrepreneurship (Magistretti et al., 2023), business dynamics (Sanasi, 2023), decision-making processes (Zemlickienė et al., 2022), and creativity in the 'R' in R&D (Robbins & Sandberg, 2023). The findings of this study lend support to prior studies showing that design leads to higher performances and outcomes, resulting in an increased annual value of 36.3% in sales.

Also, numerous studies (e.g., Noël, 2020; Nogueira & Wallig, 2022; Gonera et al., 2023; Choksy et al., 2022; Ciulli & Kolk, 2019; He et al., 2018; Cooke, 2019) show that prospective design is constantly standardized and derived from the arts and crafts. In this study, the design highlights the implications of incumbents and business model innovation for the sustainability of the circular economy principles and strengthens an interdisciplinary strategy for more consumer-centric product development,

Lastly, customer-centric approaches like design in research and innovation are growing in popularity because they allow researchers to improve people's lives and discover trends and behaviors (Fenko & van Rompay 2018; Schifferstein 2015). Like the prior study, the chosen customer-centric approach in this study can practically yield financial contributions to the stakeholders with the increased value of the developed products (per year) of 48,000 THB, equal to a 36.3% increase in sales. In addition, consumer-centric techniques require understanding customer decisions. Symmank (2019) found that customers choose products based on brand, packaging, pricing, labeling, and claims. On-pack communication provides product information, nutritional and health considerations, social responsibility, and more. In this study, the increased value of 36.3% in sales may result from the initiated brand and packaging. The findings of Nocella and Kennedy (2012) that packaging and design are essential components of the marketing mix to differentiate products and encourage environmentally friendly choices supported this conclusion. In this present study, businesses and entrepreneurs were highly satisfied with the newly developed clothing product collection at a level of 4.71.

Although this study provides several contributions, there are some limitations, as shown in the next part.

5.3 LIMITATIONS

This study has the following limitations: It employed a qualitative research method in which the researcher participated; the research participants may not accurately represent the interests of all stakeholders, a large number of stakeholders are involved in the evaluation; and

the results generated voluminous quantities of data that were difficult to manage. The outcomes, therefore, may not be widely accepted as quantitative research techniques.

5.4 IMPLICATIONS OF THE STUDY

The findings of this PAR R&D project can be applied to other local entrepreneurs with similar contexts.

5.5 SUGGESTIONS FOR FURTHER INQUIRY

The study's limitations and ramifications are incorporated into suggestions for future research. To surmount the limitations of the qualitative research method, which was chosen as the method of inquiry for this study, future research may focus on quantitative research methods. In addition, since this initiative contributes to the self-development of the stakeholders, future research should focus on their self-development.

ACKNOWLEDGEMENT

The research team thank you the Industrial Promotion Center Region 7, Department of Industrial Promotion Ministry of Industry, Thailand, for the research grant.

REFERENCES

- Alston, M., & Bowles, W. (2003). *Research for social workers* (2nd ed.). Crows Nest, NSW: Allen & Unwin.
- Appel, K., Buckingham, E., Jodoin, K., & Roth D. (2012). Participatory learning and action toolkit: For application in BSR's global programs. Retrieved from <herproject.org/downloads/curriculum-resources/herproject-pla-toolkit.pdf>
- Baum, F., MacDougall, C., & Smith, D. (2006). Participatory action research. *Journal of Epidemiology and Community Health*, 60,854-857.
- Ben Mahmoud-Jouini, S., Midler, C., & Silberzahn, P. (2016). Contributions of design thinking to project management in an innovation context. *Project management journal*, 47(2), 144-156.
- Bergold, J., & Thomas, S. (2012). Participatory research methods: A methodological approach in motion. *Forum: Qualitative Social Research*, 13(1).
- Boyle, M. (2012). *Research in action: A guide to Participatory Action Research* (Research Report). Canberra: Department of Social Services. Retrieved from <www.dss.gov.au/sites/default/files/documents/06_2012/research_in_action.pdf>

- Cardinali, S., Amadio, G., & Brezovec, A. (2023). Has everything changed or has nothing changed? Students' perception on sales professionals after the storm. *Human Systems Management*, (Preprint), 1-13.
- Davis, K. A., & Henze, R. C. (1998). Applying ethnographic perspectives to issues in cross-cultural pragmatics. *Journal of Pragmatics*, 30(4), 399-419.
- Department of Health and Human Services. (2012). *The action research and learning toolkit*. Hobart: Department of Health and Human Services Tasmania.
- Gil-Pérez, I., Rebollar, R., & Lidón, I. (2020). Without words: The effects of packaging imagery on consumer perception and response. *Current Opinion in Food Science*, 33, 69-77.
- Giovannetti, M., Sharma, A., Cardinali, S., Cedrola, E., & Rangarajan, D. (2022). Understanding salespeople's resistance to, and acceptance and leadership of customer-driven change. *Industrial Marketing Management*, 107, 433-449.
- Gonera, A., & Pabst, R. (2019). The use of design thinking in transdisciplinary research and innovation consortia: challenges, enablers, and benefits. *Journal of Innovation Management*, 7(3), 96-122.
- Greene, J. C. (2006). Evaluation, democracy and social change, In I. F. Shaw, J. C. Greene, & M. M. Mark (Eds), *The SAGE handbook of evaluation* (Chapter 5). London: SAGE.
- Kemmis, S., & McTaggart, R. (2007). Participatory action research: Communicative action and the public sphere. In N. K. Denzin, & Y. S. Lincoln (Eds), *The SAGE handbook of qualitative research*. Thousand Oaks, CA: SAGE.
- Kindon, S., Pain, R., & Kesby, M. (Eds). (2007) *Participatory action research approaches and methods: Connecting people, participation and place*. London: Routledge Land and Water Australia. (2009). *The knowledge & adoption toolkit*. Retrieved from <katoolkit.lwa.gov.au/node/29>
- Magistretti, S., Sanasi, S., Dell'Era, C., & Ghezzi, A. (2023). Entrepreneurship as design: A design process for the emergence and development of entrepreneurial opportunities. *Creativity and Innovation Management*, 32(1), 5-21.
- Mantra Crafts. (n.d.). *Three techniques for narrating tales using remnants of fabric*. <https://mantracrafts.com/3technique-patchwork-boro-quilt/>
- McCann, J. (2023). Collaborative design principles for smart clothing. In *Smart Clothes and Wearable Technology* (pp. 283-325). Woodhead Publishing.
- Micheli, P., Wilner, S. J., Bhatti, S. H., Mura, M., & Beverland, M. B. (2019). Doing design thinking: Conceptual review, synthesis, and research agenda. *Journal of Product Innovation Management*, 36(2), 124-148.
- Mody, A., & Wheeler, D. (1987). Towards a vanishing middle: Competition in the world garment industry. *World Development*, 15(10-11), 1269-1284.

- Mulroy, E. A., & Lauber, H. (2004). A user friendly approach to program evaluation and effective community interventions for families at risk of homelessness. *Social Work, 49*(4), 573-586.
- Nocella, G., & Kennedy, O. (2012). Food health claims—What consumers understand. *Food Policy, 37*(5), 571-580.
- Noël, G. (2020). Fostering Design Learning in the Era of Humanism. *She Ji: The Journal of Design, Economics, and Innovation, 6*(2), 119.
- Nogueira, A., & Wallig, J. F. (2022). The post-industrial legacy in Brazil: where circular economy principles meet collective urban practices by design. *Local Environment, 27*(10-11), 1372-1393.
- Owen, J. M. (2006). *Program evaluation: Forms and approaches* (3rd ed.). Crows Nest, NSW: Allen & Unwin.
- Pain, R., Whitman, G., Milledge, D., & Lune Rivers Trust. (2011). *Participatory action research toolkit: An introduction to using PAR as an approach to learning, research and action*. Durham: Durham University.
- Patton, M. Q. (2008). *Utilization-focused evaluation* (4th ed.). London: SAGE.
- Robbins, P., & Sandberg, B. (2023). Art Thinking: Amplifying the ‘R’ in R&D. *Journal of Innovation Management, 11*(1), IX-XXI.
- Rylander Eklund, A., Navarro Aguiar, U., & Amacker, A. (2022). Design thinking as sensemaking: Developing a pragmatist theory of practice to (re) introduce sensibility. *Journal of Product Innovation Management, 39*(1), 24-43.
- Sanasi, S. (2023). Entrepreneurial experimentation in business model dynamics: Current understanding and future opportunities. *International Entrepreneurship and Management Journal, 19*(2), 805-836.
- Sandberg, B. (2023). Art Thinking: Amplifying the ‘R’ in R&D. *Journal of Innovation Management, 11*(1), IX-XXI.
- Schwandt, T. A., & Burgon, H. (2006). Evaluation and the study of lived experience, In I. F. Shaw, J. C. Greene, & M. M. Mark, (Eds), *The SAGE handbook of evaluation* (Chapter 4). London: SAGE.
- Secundo, G., Ndou, V., Del Vecchio, P., & De Pascale, G. (2020). Sustainable development, intellectual capital and technology policies: A structured literature review and future research agenda. *Technological Forecasting and Social Change, 153*, 119917. 176
- Symmank, C. (2019). Extrinsic and intrinsic food product attributes in consumer and sensory research: literature review and quantification of the findings. *Management Review Quarterly, 69*(1), 39-74.
- Valencia, A., Mugge, R., Schoormans, J., & Schifferstein, H. (2015). The design of smart product-service systems (PSSs): An exploration of design characteristics. *International Journal of Design, 9*(1).

- Verganti, R., Dell’Era, C., & Swan, K. S. (2021). Design thinking: Critical analysis and future evolution. *Journal of product innovation management*, 38(6), 603-622.
- Zemlickienė, V., Lapinskaitė, I., & Turskis, Z. (2022). Internal Communication in R&D: Decision-Making Methods Based on Expert Approaches. *Sustainability*, 14(19), 11839. Durham: Durham University.
- Owen, J. M. (2006). *Program evaluation: Forms and approaches* (3rd ed.). Crows Nest, NSW: Allen & Unwin.