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Exploring Product Innovations of Pottery Industries in Sri Lanka

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Abstract:
The pottery sector, with its archaeological significance, supports small businesses and contractors, contributing significantly to the economy. Technological advancements in the past two decades have expanded the sector's potential and driven pottery product innovation, crucial for adapting to changing environments. Research on Kurunegala district's pottery industries highlighted the importance of innovation for competitiveness and market success. Using a qualitative approach, data from pottery industry owners who recently adopted innovations were collected through face-to-face interviews. Thematic analysis showed that Kurunegala's pottery industry is increasingly adopting innovations, mainly in product design and manufacturing. The study emphasized that product innovation is vital, as it directly connects businesses with customers. Key factors influencing product innovation include diversified products and high-quality raw materials. The research suggested that businesses should focus on customers' evolving needs and preferences, blending artistic expression with new technologies to enhance production and design.

Keywords: Pottery Industry, Innovation Capability, Product Innovations, Kurunegala District, Sri Lanka

1. Introduction

The pottery industry in Sri Lanka plays a significant role in the national economy, contributing to income generation, employment, and cultural preservation. Pottery and related industries have evolved over time, showcasing intricate craftsmanship that embodies the country's cultural and historical identity. Declared a priority investment sector by the Sri Lankan government, pottery contributes approximately 30% to GDP and employs 25% of the workforce, particularly in rural areas. The Kurunegala district stands out as a hub for traditional clay pottery, housing numerous enterprises that rely on locally sourced resources (Ceramics in Sri Lanka, 2015; Situation Report on Pottery Industry, 2019).

The pottery industry is recognized as part of the creative and cultural sectors, crucial for fostering creativity and innovation in Sri Lanka. According to Hirimuthugodage et al. (2020), the industry thrives on traditional practices and creativity, embodying Sri Lankan cultural identities, traditions, work ethics, and historical philosophies. This sector supports an understanding of trade dynamics, manufacturing routines, cultural identity, and artistic traditions (Odelli et al., 2020).

Innovation and creativity drive growth in the pottery industry by generating new ideas, improving existing methods, and integrating technology (Abernathy and Utterback, 1978). Combining traditional craftsmanship with modern techniques and materials enhances production processes, making pottery more versatile and competitive (Esmalglass Itaca, 2022). Technology is integral to pottery production, refining processes rather than overhauling them entirely (Esmalglass Itaca, 2022). Advancements like expanded pigment options, precise color application, and digital printing elevate designs (Esmalglass Itaca, 2022). Automation boosts precision, slashes production times, and lowers costs (Esmalglass Itaca, 2022). Technology enables diverse patterns and textures, even mimicking natural materials like marble and wood (Esmalglass Itaca, 2022). Customization through digital printing enhances ceramics' branding potential (Esmalglass Itaca, 2022). These innovations bolster efficiency, design quality, and resource utilization, benefiting workers and the

economy (Nicklin, 1971). Integrating technology with traditional methods ensures resilience and market relevance (Esmalglass Itaca, 2022).

Despite its importance, the industry faces numerous challenges that threaten its sustainability. Traditional practices remain central to pottery production, but the younger generation's declining interest in artisanal methods and a shift toward more mechanized techniques have compromised the quality and authenticity of Sri Lankan pottery. Furthermore, economic difficulties, rising energy costs, and increased prices for essential materials like firewood and modern equipment, such as electric kilns, have constrained the production capacities of small-scale potters. Many artisans are forced to rely on outdated and inefficient methods, such as open bonfires, further limiting their ability to compete in modern markets (EconomyNext, 2022; UN COMTRADE Database, 2021).

The export performance of ceramic pottery has also seen a decline, dropping from $30 million in 2019 to $24 million in 2020. This downturn is attributed to insufficient infrastructure, technological gaps, and reduced competitiveness in global markets. These issues are compounded by limited access to international markets, which restricts the industry's growth potential (UN COMTRADE Database, 2021; Daily FT, 2021).

Innovation in the pottery industry, essential for enhancing operations, encompasses product, process, marketing, organizational, and paradigm innovations, offering financial and competitive benefits. The Oslo Manual (2018) defines business innovation as significantly improved products or processes, with product innovation (PI) being crucial for consumer engagement and enterprise goals. In MSMEs, innovation drives performance but faces challenges, especially in pottery due to reliance on traditional methods (Kasemi, 2014).

This article emphasizes product innovation as the foundation of business, crucial for direct customer engagement and competitiveness. Success hinges on meeting customer demands, satisfying market niches, and introducing new products, enabling companies to endure globalization and technological advances while reflecting their brand (Reguia, 2014). This study explores product innovation (PI) in the pottery industry of Kurunegala District to help overcome challenges and constraints. With IC, pottery industries can increase their performance and drive away the failure aspects of the ceramic sector. There is some wealth of evidence in the literature indicating the integration between innovation and the pottery industry's performance. Therefore, the problem statement addresses the "How pottery industry in Kurunegala district demonstrate different product innovations?"

Research Questions

The specific research questions have been formulated as follows:

I. How do pottery industries diversify pottery products?

II. How do pottery industries demonstrate quality and productive raw materials in their production process?

Research Objectives

The specific research objectives which are to be accomplished at the end of the research project are as follows.

I. To explore the diversified pottery products in the pottery industries

II. To explore the quality and productive raw materials in their production process

2. Literature Review

2.1 Innovation Capabilities (IC)

Intellectual Capital (IC) and innovation capabilities are critical for organizational competitiveness and sustainability. IC represents a firm's ability to generate and implement new ideas into improved products, services, or processes, crucial for adapting to dynamic markets (Neely et al., 2001; Esterhuizen et al., 2012). Schumpeter's five innovation types and the Oslo Manual (2018) emphasize product and process innovations as vital for progress. Dynamic capabilities further enhance competitive advantage in evolving environments (Teece & Pisano, 1994). Innovation's success hinges on fostering creativity, organizational learning, and systemic factors that drive effective innovation practices (Myers & Marquis, 1969; Amabile et al., 1996).

2.2 Product Innovation (PI)

This article highlights product innovation (PI) in pottery, utilizing new or existing knowledge and technologies (Oslo Manual 2018). Product innovation (PI) in pottery integrates modern knowledge and

technologies, creating diverse items like casting ceramics, decorative pottery, and cultural artifacts influenced by tradition (Oslo Manual, 2018; Tian & Hu, 2021). Innovations leverage Sri Lanka's rich clay resources, including ball and kaolin clay, ensuring product durability and suitability (EDB, 2020). With clay as the core material, potters enhance longevity using auxiliary elements. Products reflect cultural and religious influences, such as Buddha statues and sculptures, catering to home, workplace, and religious settings (Termizi & Mohamed, 2016; Lalithambika, 2016).

As Figure 1 explained, PI can be categorized into major themes and sub-themes in that way.

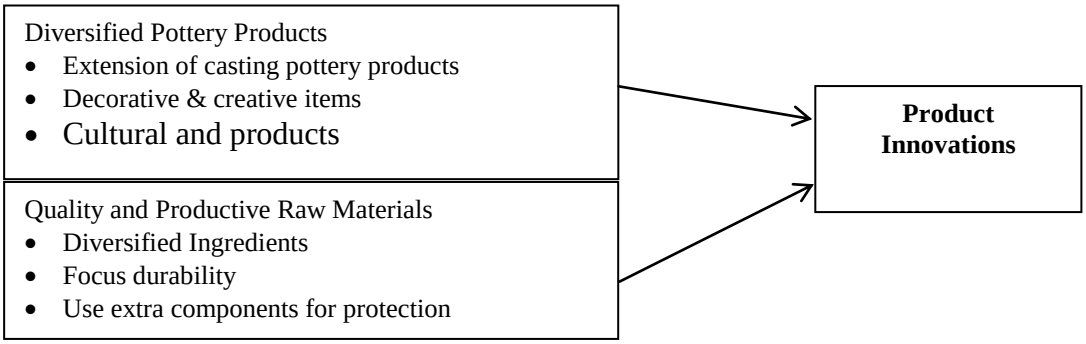

Figure 1: Product Innovations

Potters are creative individuals who experiment with various clays, glazes, textures, and firing techniques to innovate and develop new designs (Hood, 2014). Modern potters, often working in rural settings, apply Intellectual Capital (IC) to enhance their craft (Gibbs, 2015). Although pottery has historical roots with limited technological influence, recent studies show that the industry is now embracing IC. However, Product Innovation (PI) remains underexplored in small pottery industries, such as those in Sri Lanka's Kurunegala district, which this study aims to investigate further.

3. Material And Method:

The study uses a qualitative, inductive approach, emphasizing exploratory purposes and subjective interpretations, with interpretivism as the philosophical stance (Saunders et al., 2011). The research employs a phenomenological methodology to capture participants' experiences and identify thematic patterns. The sample, based on purposive non-probability sampling, consists of seven pottery owners in Kurunegala, Sri Lanka, selected to provide diverse insights into intellectual capital (Creswell, 2013). Data was collected through semi-structured, face-to-face interviews, and analyzed using thematic analysis, with interviews translated from Sinhala to English (Saunders et al., 2011; Holden and Lynch, 2004).

4. Result:

4.1 Sample Profile

The study sample consists of 7 pottery industry people from the Kurunegala district. The researcher selected pottery people who have heterogeneous characteristics in their industry. Respondents were selected based on a number of factors, such as the type of business, the scale of operation, types of products they made, processes used, ownership, and skills of potters.

Respondent's Name	Product line	Location	Start Year
Owner 1	Small-scale producer by creating Wedding cake boxes	Mawathagama	From his mature age
Owner 2	Produce Decorative products/ trees	Wariyapola	From their childhood
Owner 3	Making Thaipongal pots	Hettipola	From 2019
Owner 4	Producing religious products	Beddegama	From their childhood
Owner 5	Building natural houses (large scale/ small scale projects)	Katupotha	From 2010

Owner 6	Producing decorative macramé	Panduwasnuwra	From their childhood
Owner 7	Producing clay stove	Hettipola	During a crisis in the country

Table 1: Profile of the pottery business people in this study

Table 1 explains the heterogeneous characteristics of the pottery industry people that the researcher interviewed. The majority of the data were gathered through a series of semi-structured interviews with pottery people in the Kurunegala district.

4.2 Product Innovation

According to the Oslo Manual (2018), product innovation is the primary form of innovation, particularly crucial in the pottery industry. Product innovation encompasses activities that transform inputs into pottery products, including facility usage, technical testing, analysis, and certification to support production. Talin (2021) defines product innovation in pottery as creating new designs that blend contemporary applications. The researcher questioned pottery owners about their demonstration of product innovations, and all interviewed owners confirmed engaging in such practices. They reported diversifying their pottery products more than before and utilizing productive raw materials to sustain and enhance their business processes.

4.2.1 Diversified Pottery Products

Entire pottery people agreed that they are creating the diversified pottery products than before. Previous studies have shown that "the current world ceramic industry is diversified" (Tian and Hu, 2021). Owner 01 who is a producer of innovative wedding cake boxes responded in this manner. *"Nowadays, we diversify products more than before."*

Owner 4 who is an innovative potter said, *"In the early stages, we produced kitchenware products only. But now, we diversified products than before".*

I. Extension of casting pottery products

Pottery business owners are innovating by diversifying their products in today's working environment, expanding each product line more than before. A notable innovation in the industry is the creation of casting pottery products, as outlined in Table 1.1. Some sources suggest that the casting method is particularly innovative in modern settings (Termizi and Mohamed, 2016). Owner 01 confirmed this trend; *"we are now producing casting pottery products in white, a shift from red pottery, using ceramic clay as the primary materials."*

This innovation extends to the creation of innovative items such as cake-containing boxes and promotional products using the casting technique. For weddings, pottery owners design creative cake-containing boxes tailored to factors like the bride's sari color, offering designs like cricket balls, basketballs, cars, and flowers. Additionally, they craft pottery compliments for businesses, customizing promotional items based on company products. For instance, a bookselling company requested pottery complements designed in the shape of books.

	Extension of casting pottery products	**Examples of specific quotes**
a.	Innovative cake containing boxes	"Especially we make cakes containing boxes by using ceramic clay. I make unit cake boxes/ wedding cake boxes (different designs such as cricket balls, cars, and flowers)" – Owner 01
		"Previously people used cardboard boxes to contain cakes. But now we invent new products for this" – Owner 01
b.	Produce compliments & promotional items	"I make items that are used as a compliment. We produce compliment products for companies. Some companies need compliments at the end of the year. We make promotional items for companies." – Owner 01

Table 4.1: Extension of casting pottery products

II. Decorative & creative items

Pottery industry people produce more innovative, decorative, and creative items. Previously they made traditional kitchenware products only. But now they diversified their products into creative and decorative items. Decorative pottery has great scope due to product diversification (Lalithambika, 2016). Most of the pottery owners confirmed this innovation. Owner 02 explained, "*We produced decorative pottery items".* Pottery owners innovate by creating decorative clay macramé, diversifying their products through manual and modern machinery techniques. Table 1.2 outlines various decorative items crafted by modern potters, including innovative kitchenware, soup cups, and decorative trees suitable for homes, gardens, and workplaces. Ceramic decorative innovations permeate homes, extending to gas pots and clay-based kitchenware for hotels. Some potters specialize in producing clay houses, catering to both large and small-scale demands across Sri Lanka (Robichaud, 2009).

	Decorative & creative items	**Examples of specific quotes**
a.	innovative, Decorative & creative products for the workplace	"We produced decorative pottery items as a model of a tree. In the tree, there are branches and customers can decorate branches by putting a flower pot. Finally, customers can look at the tree as decorative flower tress." – Owner 03
		"I am making decorative Thaiponsal pots and decorate them including color patterns such as the sun, cow." – Owner 03
b.	innovative kitchenware items	"Also creates coup cups and spoons, Curry dishes, gas pots, water bottles, Guruleththu, etc." – Owner 04
		"In the latest way, we produce gas pots as an innovation" – Owner 06
		"We produce 3 types of stoves such as single stove, double stove, and Charcoal stove. The modern stove is the Charcoal stove." – Owner 07
c.	Soup cups and spoons for hotels	"Soup cups & soup spoons are ordered by Hotels, and I produced those items for the special target audience" – Owner 04
d.	Build natural houses & decorate existing houses	"I build clay houses. And also I give a natural look to existing houses. I build a new house as well as decorate existing houses naturally" – Owner 05

Table 4.2: Decorative & creative items

III. Cultural Products

Recently, most pottery people diversified their pottery items based on a cultural and religious foundation. Amazon website has shown that current pottery people's religious product creations using clay such as Pooja items for Tamil people, statues of God, Buddha statues, Jesus sculptures, some of the idols in Tamil religious, etc. As Table 1.3 explains, they alter cultural changes and produce highly religious-based customized products. Owner 03 stated that *"newly innovative Thaipongol pots are targeted at Tamil people in India."* And also owner 04 confirmed this diversified products as this way. *" Buddhist people and people who related to the temple order these items."* Through this, the researcher identified that potters are connected with the religious side as well as cultural foundations.

	Cultural products	**Examples of specific quotes**
a.	Buddha bowls and Buddha statues	"We produce Buddha statues and pottery products belonging to the Buddhist religion. Also, we produce different types of Buddha bowls based on their size of it."- Owner 04
		"Most of the kitchenware products are related to Sinhala tradition. And also we produce pots/cups/cooking pots for Tamil people. The bottom is not wide in Tamil people's cups." – Owner 03
b.	Thai Pongal pots for the global market	We target Tamil people and these pots are used for Thaipongal days. Tamil people use this for boiling milk on Thaipongal days. I am making Thaiponsal pots and the shape of the pot is different than other products. And I draw pictures in the pot including the sun, cow, etc" – Owner 03

Table 4.3: Cultural Products

Researchers identified product diversification as a key innovation theme in pottery. Potters now produce casting pottery, decorative items, and cultural products. The Sri Lanka Export Development Board (2020) and Gui (2019) noted unique, aesthetically advanced designs due to technological advancements. Empirical studies and interviews confirm casting techniques' role in shaping uniform items, while decorative items and cultural pottery are crafted from various clays, reflecting broader trends and cultural practices

4.2.2 Quality and Productive Raw Materials

All the pottery owners agreed with this statement. Entire pottery people use quality and productive raw materials for their goods' manufacturing process. When potters use quality and productive raw materials, they can produce more durable and long-lasting pottery items. Previous studies have shown that the richness of materials is related to the *diversification* of *product* modeling in the pottery industry (Atlantis-press.com, 2020). Owner 04 is a producer of Buddha bowls and he responded *"We are dissolving clay and keeping it filtering. Then we get more smooth clay. That smooth clay is very productive, with no stone and unnecessary items."*

I. Diversified Ingredients

Tian and Hu (2021) emphasize the significance of updating materials in pottery design for the advancement of the ceramic industry. Through interviews, various raw materials used in pottery manufacturing were explored. Interviewees revealed the use of diverse ingredients, including Sri Lankan and foreign clays, as well as different clays for distinct production stages. These ingredients range from ball clay, kaolin clay, and

various sands to imported clay from foreign sources and Humbas clay. Raw clay is sourced from different locations in Sri Lanka. Some pottery owners, like Owner 01 producing innovative cake-containing boxes, confirmed the utilization of diverse clay components. Respondents acknowledged employing a mixture of clay components in their processes, with some altering clay types for different pottery products. The majority of innovative potters indicated the adoption of modern raw materials in their production processes.

	Diversified ingredients	**Examples of specific quotes**
a.	Use a mixture of clay components	"We use a mixture of components to make clay/ inputs/raw materials such as Ball clay, kaolin clay, different sands, use clay that is imported from foreign counties (use for durability). And we mix/ grind all things" – Owner 01
		"For Guruleththu, we use white clay and Kelani clay. First, we make Guruleththu by using Kelani clay (red clay). Then we use white clay (ceramic clay) over it. Then we cut the design. So design appears in red clay." – Owner 04
		"I use different types of clay. Final completion is done by "Humbas clay"."- Owner 05
		"Also, we need a small amount of clay/powder that is imported from foreign companies."- Owner 01
b.	Use modern materials	"I use ceramic clay as modern clay material for making pottery products" – Owner 01
		" We use clay that is imported from foreign countries"- Owner 01

Table 4.4: Diversified Ingredients

II. Focus durability

Potters prioritize durability by using quality raw materials and ensuring an effective production process, minimizing losses. Durable products result from effective steps and high-quality raw clay and resources, enhancing the pottery's longevity. To prove this, Owner 02 who produces decorative products stated that,

"Then we have to tan clay to reduce damage/explosion. When we properly tan clay, it is heat resistant. Then the final products become durable."

By further explaining owner 06 who produces decorative clay macramé stated that,

"Through the kerosene, we can get light color and durability for decoration."

III. Use extra components for protection

Some potters use extra components for the protection of the final product. These supportive and intermediary components are used to create clay materials as more qualified and productive. Some pottery producers use modern components and liquid items to make raw materials more productive and quality. This is evidenced by owners 01, 04, and 06. They stated that, by using extra components, they can sustain the product's protection.

Respondent	**Examples of specific quotes**
Owner 01	"And also we use clay liquid"
Owner 04	"We make decorative products by hand and paint them. Dai is used for coloring decorative products."
Owner 06	"For coloring, we use a warmish and kerosene mix. Through that kerosene, we can get light color and durability for decoration."

Table 4.5: Use extra components for protection

According to the interviewees' responses, quality and productive raw materials are other ways of product innovation in the modern working environment. Product innovation refers to activities that transform input into output. Clay is the core input in the pottery business. When potters use quality and productive clay materials, the final output will be quality. Therefore, the majority of interviewees confirmed that most of the time they maintain productive and quality raw materials. They stated they diversified clay ingredients, generally focused on durability, used extra components for the protection of the final pottery product, and

focused availability and suitability of clay materials. These aspects are the foundation for productive and quality raw materials.
The Sri Lanka Export Development Board (2020) highlights the rich clay resources in Sri Lanka, categorized into Earthenware, Ball, and White clay varieties, pivotal for diverse clayware. Earthenware clay, abundant in Naththandiya, serves brick and pottery needs. Ball clay, predominant in Boralesgamuwa and Meetiyagoda, is vital for pottery and porcelain. Sri Lankan potters favor terracotta, blending clay from across the country, ensuring quality and durability through meticulous raw material selection based on firing requirements. This abundance of clay ingredients and their careful curation underpin innovation in Sri Lankan pottery.

5. Discussion:

This research study aimed to explore the innovation capabilities of pottery industries in the Kurunegala district. Therefore, using the innovation typology will provide this benefit for the pottery industry to explore innovations in their businesses. Therefore, this study was carried out with the following Main research objective.

- To explore the product innovations in the pottery industries

The study is based on 07 heterogeneous pottery industry people from the Kurunegala district and a qualitative phenomenological approach was adopted to achieve the research objectives.
The core innovation type considered for the pottery industry is product innovation. Product innovations in the pottery industry refer to the activities that transform inputs into pottery products. The total sample size of pottery owners who were interviewed confirmed that they have experienced PI in their business processes. All of the pottery people confirmed that they diversified their pottery products more than before. Diversified pottery products rely on an extension of casting pottery products, decorative and creative items, and cultural products. The majority of potters stated they use quality and productive raw clay materials for sustaining the business as well as enhancing their business process.

Recommendations:

The pottery industry is an integral part of our history and archaeology. It is an important part of tradition and culture. Nowadays, potters are combined with technological advancements. This research study's findings show the different innovation capabilities of pottery industries in the Kurunegala district. Those ICs have helped pottery owners in a constrained environment succeed as business operators. Furthermore, these study findings can be used to help aspiring entrepreneurs who are in a constrained environment. Moreover, pottery people can improve their business operations efficiently and effectively. Therefore, it is recommended that policymakers and organizations should provide support services for the pottery industry people. Also, legal institutes and governments that conduct supportive programs are recommended here.

6. Conclusion:

These qualitative phenomenological studies helped to understand the innovation capabilities of pottery industries in the Kurunegala district. Further, findings revealed how the pottery industry in the Kurunegala district demonstrates different innovation capabilities. Respondents from pottery owners in the Kurunegala district practiced the ICs of product innovations. They have adopted product innovations including diversified pottery products and quality and productive raw materials. Compared to the discussed ICs, some traditional pottery practices were found among the business operators. The respondents who had used those innovations have used them as a problem-solving approach, and the findings illustrate that they have used those in the form of advantages. Regarding the pattern of the adaptation into ICs of the pottery industry, respondents show that they had rapidly adapted to these. Therefore, it can be concluded that pottery industries in the Kurunegala district have adopted innovation capabilities. This study offers researchers and entrepreneurs a deeper understanding of the ICs used by successful and innovative pottery owners in the Kurunegala district.

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