

Shifting The Coffee Business Through Entrepreneurship: Technology Innovation, Creativity, and Cultural Change

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ABSTRACT

Purpose: This study examines how coffee drinking culture has shifted and transformed the coffee business through technology and creativity. Using Richard Florida's creativity process framework, this research seeks to clarify how creative ideas can be transformed into innovation.

Methods: This research uses a mixed-methods approach, starting with a literature review on the technological innovation process in coffee machines, followed by observations and interviews with 3 coffee business owners.

Findings: The findings indicate that technological advancements have enhanced the coffee industry and influenced coffee consumption culture in Indonesia. Coffee currently functions as an emblem of social standing and personal identity for its drinkers. Technological advancements have facilitated growth in the coffee beverage industry and influenced coffee-drinking culture in Indonesia. Coffee drinks currently represent indicators of social standing and personal identity.

Research limitations: This study explores changes in coffee drinking culture in the context of 3 coffee businesses across West Java, Indonesia. Findings specific to this setting have been obtained; however, the results might differ if the study were conducted in other areas, regions, or countries. Furthermore, the methodology employed was limited to a literature review and in-depth interviews as qualitative methods.

Practical implication: The findings provide important insights for regulators to strengthen accounting standards and promote greater professionalism among accountants. They also offer practical implications for companies seeking to enhance their future growth opportunities.

Originality/Value: Different from the design thinking concept that requires the creator (ideators) to revert to the beginning and change the idea if the market test fails, by applying Richard Florida's framework of the creativity process to innovation, it reveals that revision and adjustments can be made during the final stage in response to feedback. Coffee entrepreneurs can transform creativity into innovation without repeating the entire idea-generation process, which typically consumes time and resources.

Keywords: Coffee business, Entrepreneurship, Technology Innovation, Creativity Process, Cultural Change

1. INTRODUCTION

Coffee has evolved beyond its traditional role as a beverage to become an important economic commodity, a cultural symbol, and a driver of entrepreneurial innovation. Globally, the coffee industry has transformed significantly due to technological advances, digitalization, and changing consumer preferences. Coffee shops are no longer merely places for purchasing beverages; they have become spaces for social interaction, identity construction, creative expression, and lifestyle consumption. In Indonesia, one of the world's largest coffee-producing countries, the rapid expansion of specialty coffee shops and digital coffee businesses has accelerated the transformation of coffee consumption patterns, particularly among younger generations.

The emergence of the "third wave coffee" movement has shifted consumer expectations from simply consuming coffee toward appreciating coffee quality, origin, brewing methods, and overall customer experience. At the same time, technological innovations—including automated roasting systems, precision brewing equipment, digital ordering platforms, mobile applications, and social media marketing—have significantly reshaped coffee production, distribution, and consumption. These developments have enabled coffee entrepreneurs to improve production efficiency, maintain product consistency, enhance customer engagement, and increase business competitiveness.

Previous studies have examined technological innovation in coffee production, including precision agriculture, smart roasting technologies, automated brewing systems, digital marketing, and sustainability initiatives. Other scholars have investigated coffee consumption from sociological and cultural perspectives, emphasizing coffee as a symbol of social interaction, prestige, and lifestyle. Entrepreneurship studies have also highlighted the importance of creativity, innovation capability, and opportunity recognition in developing competitive small and medium-sized enterprises (SMEs). However, these studies generally investigate technological innovation, entrepreneurial

creativity, or coffee culture independently rather than examining how these dimensions interact to transform coffee businesses and consumer culture simultaneously.

Richard Florida's Creativity Process offers a valuable theoretical perspective on how creative ideas evolve into innovation through four sequential stages: preparation, incubation, illumination, and verification. While Florida's framework has been widely discussed in the context of the creative economy and entrepreneurship, few empirical studies have applied it to explain how technological innovation supports entrepreneurial adaptation and cultural transformation in the coffee industry. Moreover, little is known about how entrepreneurs integrate technological innovation into the creative process to respond to changing consumer expectations and sustain business competitiveness within Indonesia's rapidly growing coffee sector.

Accordingly, this study addresses the following research gap. Existing literature has extensively discussed (1) technological innovation in coffee production, (2) coffee drinking culture and consumer behavior, and (3) entrepreneurial creativity as separate research streams. Nevertheless, empirical evidence explaining the interaction between technological innovation, entrepreneurial creativity, and cultural transformation within Indonesian coffee businesses remains limited. Furthermore, previous studies rarely examine how Richard Florida's Creativity Process explains the successful transformation of creative ideas into technological innovation within coffee SMEs.

To address this gap, this study investigates how technological innovation influences entrepreneurial creativity and contributes to cultural change in Indonesian coffee businesses through the lens of Richard Florida's Creativity Process. Specifically, this research seeks to answer the following questions:

1. How does technological innovation support entrepreneurial development in Indonesian coffee businesses?
2. How can Richard Florida's Creativity Process explain innovation practices among coffee entrepreneurs?
3. How does technological innovation contribute to the transformation of contemporary coffee-drinking culture?

The findings are expected to contribute theoretically by extending Richard Florida's Creativity Process to technology-driven entrepreneurship in the coffee industry. Rather than viewing creativity solely as an internal ideation process, this study demonstrates how technological innovation, market feedback, and cultural adaptation interact dynamically to sustain entrepreneurial competitiveness. Practically, the study provides useful insights for coffee entrepreneurs, SME practitioners, policymakers, and creative industry stakeholders regarding technology adoption, innovation management, and sustainable business development in Indonesia's coffee sector.

2. RESEARCH METHODOLOGY

Research Design

This study employed a qualitative multiple-case study design to investigate how technological innovation contributes to entrepreneurial creativity and cultural transformation in the Indonesian coffee business. A qualitative approach was considered appropriate because the study aimed to explore the experiences, perceptions, and innovation practices of coffee entrepreneurs within their real business contexts rather than to test causal relationships statistically. The research adopted Richard Florida's Creativity Process as the analytical framework for interpreting how creative ideas are transformed into innovation through preparation, incubation, illumination, and verification.

In conducting this research, the author employs a qualitative method through a literature review and in-depth interviews with three café owners regarding the use of machines and equipment. The author conducted a literature review on the development of coffee machine technology, focusing on semi-automatic roasting machines that facilitate the coffee production process. Based on this, the study examined how semi-automatic roasting machines make work easier and maximize output, ensuring that the quality of the coffee grounds meets varying levels of maturity according to consumer demand. Figure 2 illustrates the stages of the research.

Figure 1. Four Stages of Research



Source: Author, 2025

Case Selection and Participants

Purposive sampling was used to select information-rich cases that could provide meaningful insights into technology adoption and entrepreneurial innovation. Three independent coffee businesses operating in West Java,

Indonesia, were selected based on the following criteria: operating for at least two years; actively using modern coffee machines and brewing technologies; producing specialty coffee products; and owners' willingness to participate in in-depth interviews. The selected cafés represented different stages of business development, business scale, technological capability, and market performance, allowing comparison across multiple entrepreneurial contexts. To preserve confidentiality, the businesses are identified using pseudonyms

Data Collection

Data collection was conducted between late 2024 and mid-2025 using three complementary techniques:

(1) Literature Review

A systematic review of previous studies was undertaken to identify technological developments in coffee production, roasting systems, coffee machines, digital marketing, and entrepreneurship. This review also provided the theoretical foundation for applying Richard Florida's Creativity Process.

(2) Field Observation

Direct observations were carried out in each café to examine the coffee production workflow, roasting process, brewing equipment, machine utilization, customer interaction, and operational practices. Field notes and photographic documentation supported the interview findings.

(3) Semi-Structured Interviews

Semi-structured interviews were conducted with the owners of the three coffee businesses. Each interview lasted approximately 60–90 minutes and was conducted face-to-face at the respective cafés. The interview protocol covered five main themes: entrepreneurial background; technology adoption; product innovation; customer preferences; business challenges and future development. Open-ended questions allowed participants to elaborate on their experiences while ensuring consistency across cases.

Data Analysis

The interview recordings were transcribed verbatim and analyzed using thematic analysis following Braun and Clarke's six-step procedure.

The analytical process consisted of four stages:

Stage 1: Familiarization

Interview transcripts, field notes, and observation records were repeatedly read to obtain an overall understanding of the data.

Stage 2: Open Coding

Meaningful statements related to technology, innovation, entrepreneurship, and customer behavior were assigned initial codes.

Examples of initial codes included production efficiency, product consistency, customer experience, technology investment, marketing strategy, and business sustainability.

Stage 3: Categorization

Similar codes were grouped into broader categories representing common business practices and entrepreneurial strategies.

Stage 4: Theme Development

The categories were synthesized into four major themes: Technology improves operational efficiency. Technology enhances product quality and consistency. Technology supports entrepreneurial innovation. Technology contributes to cultural transformation in coffee consumption. These themes were subsequently interpreted using Richard Florida's Creativity Process

Trustworthiness

To enhance the credibility and reliability of the findings, several strategies were employed.

Data triangulation was achieved by integrating information obtained from literature review, field observations, and interviews.

Methodological triangulation strengthened the consistency of evidence by combining documentary analysis with qualitative interviews.

Member checking was conducted by confirming interview summaries with participants to ensure accurate interpretation of their responses. Additionally, the researchers maintained an audit trail documenting coding decisions and analytical procedures throughout the study

Ethical Considerations

Participation in this study was voluntary. Before each interview, participants were informed about the research objectives and provided informed consent. The identities of the participating businesses and respondents were anonymized using pseudonyms to maintain confidentiality. Interview transcripts were securely stored and used exclusively for academic purposes

Research Framework

The research was implemented through four sequential stages:

- 1. **Literature Review** – identification of technological innovation and theoretical framework;
- 2. **Observation and Semi-Structured Interviews** – collection of empirical data from coffee entrepreneurs;
- 3. **Coding and Thematic Analysis** – identification of categories and themes;
- 4. **Interpretation and Conclusion** – interpretation of findings using Richard Florida's Creativity Process and formulation of theoretical and managerial implications.

This research framework illustrates the systematic process through which empirical evidence was collected, analyzed, and interpreted to explain the relationship between technological innovation, entrepreneurial creativity, and cultural transformation in Indonesian coffee businesses.

3. RESULT AND DISCUSSION

Result

Initial investigations examined the coffee preparation procedure. A vital aspect to contemplate is the roasting procedure. The roasting phase in coffee manufacturing precedes grinding. The process begins with water evaporation, followed by pyrolysis. Roasting typically lasts 20 to 30 minutes. Consequently, in this age of globalization, roasting machines have shifted from manual to semi-automatic variants that employ microcontrollers. This development aims to improve the apparatus's efficiency. Energy efficiency is essential for machine operation and minimizing wait times, enabling coffee beans to roast more quickly than with manual roasting machines (Suhono, 2023). Table 1 illustrates the three stages of maturity in the roasting procedure.

Table 1: Levels of Coffee Bean Maturity in the Roasting Process

No.	Maturity Type	Example Image	Explanation
1.	Light Roast		At this stage, coffee beans are roasted at 196-205°C until the first crack is heard. This stage of maturity is defined by a yellowish-brown hue.
2.	Medium Roast		At this stage, coffee beans are roasted at 210-219°C until they reach the first crack without progressing to the second crack. At this point, the coffee beans have a deeper hue.

3.	Dark Roast		At this stage, coffee beans are roasted at temperatures exceeding 225°C until the second crack occurs. Consequently, the hue turns deeper, and oil appears on the surface.
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Source: Suhono, 2023

The alterations in coffee beans resulting from the roasting process can be classified into three categories: Variation in moisture levels: This phenomenon transpires as heat is transferred from the roasting medium to the substance, leading to the movement of water mass throughout the roasting procedure. The moisture within the substance evaporates until it attains a state of saturation. Alteration in texture: This phenomenon occurs as a result of the temperature fluctuations used throughout the roasting process. The roasting process influences how quickly moisture dissipates from the coffee beans. Hue alteration: The color change during roasting is due to sugar caramelization, culminating in a deep brown hue when the coffee reaches full roast. The interaction of sugars and amino acids derived from proteins is called non-enzymatic browning, commonly known as the Maillard reaction.

Advances in coffee machinery, especially roasting apparatus, can influence the quality of the coffee grounds available for sale. The coffee roasting apparatus owned by Anilatul Bahroin and Agung Prijo Budijono, as cited in Suhono (2023), incorporates a roasting mechanism that uses temperature as a benchmark during the roasting process. This roasting apparatus utilizes thermocouples to detect temperature fluctuations and thermocontrol for temperature management established by the production unit. Upon reaching the designated temperature, the thermocouple activates the thermocontrol, which subsequently disconnects the AC power to the solenoid valve. The solenoid valve shuts the gas entry to the burner, deactivating the burner. I am running a few minutes late; my previous meeting is running over. The roasting speed is regulated using pulse width modulation (PWM), adjustable via a potentiometer. Consequently, consumers can adjust the speed according to their preferences based on the prior assessment. This roasting machine control system operates at 30 rpm and 60 rpm. The designated temperatures are 140°C, 150°C, and 160°C. As a result, this control system yields roasting outcomes that align with coffee standards. At 60 rpm, 150°C, and 25 minutes, the coffee beans showed a 22% decrease in moisture, resulting in a light roast hue (Suhono, 2023).

A different discovery was made at Astrophilia Coffee, a small to medium-sized enterprise (SME) café situated on Jl. Tanah Serela Raya, Tambora, West Jakarta. Astrophilia Coffee possesses a coffee machine; however, its operation remains partially automated. Consequently, the system still requires button presses and human judgment. Nonetheless, these buttons frequently fail, making the apparatus difficult to use effectively and leading to inconsistent coffee flavor quality. An Android-controlled automatic espresso machine using Arduino technology has been developed to address this problem. This alleviates the barista's burden in beverage preparation. In this context, manual control systems are defined as control systems that utilize individuals or live organisms, such as people. Automated control systems, by contrast, use control apparatuses such as controllers. Consequently, the developed control system is significant as the apparatus is constructed with the aid of Android control. The software executes this regulatory framework (Wasid & Fadilah, 2024). Table 2 presents all results.

The interviews conducted between late 2024 and mid-2025, as shown in Table 2, indicate that technological advancements in coffee machines are vital to the prosperity and longevity of coffee beverage enterprises, alongside other factors such as location and marketing tactics.

Table 2: Results of Interviews with Three Entrepreneurs in West Java

No	Cafe Name, Years of Operation	Number of Employees or Visitors	Type of Coffee Machines and Equipment Owned	Development Strategy
1	“AL” (10 years)	14, 50-60 visitors on weekdays, 15-200 visitors on weekends.	The Petroncini roasting apparatus, boasting a 15 kg capacity, delivers even roasting and efficiently satisfies supply requirements. The La Cimbali 2-group espresso machine produces espresso and froths milk efficiently, although its	Product innovation is essential as consumers consistently seek novel offerings. Staying abreast of contemporary

			age of around 9 years has reduced consistency. The Mazzer grinder yields high-quality, uniform grinds; however, the grinding time is somewhat long. Manual brewing apparatus, including the Hario V60, Kalita Wave, Flat Bottom, and Cold Drip, paired with the 600N grinder, is quite beneficial for production because of its commercial design. The espresso machine should be replaced due to its age and outdated technology.	trends and enhancing quality and taste is crucial. Location matters, including maintaining cleanliness and a comfortable atmosphere.
2	“SG” (2 years)	7, with 40-50 visitors on weekdays and 100-150 visitors on weekends.	The La Marzocco Linea 2GR espresso machine is a premium coffee apparatus that provides uniform extraction and sophisticated volumetric technology for rapid output. The Anfim Milano grinder, with substantial burrs, enables faster, more uniform grinding. Manual brewing apparatus include the Hario V60, AeroPress, and Hario electric grinder. The La Marzocco brand is frequently considered the "Rolls-Royce" of the coffee industry; hence, it is unsurprising that the caliber of its offerings in “SG” is outstanding.	Advancement is a crucial element. SG's deficiency is attributed to insufficient promotion. .
3	“LK” (4 years)	11employees 60 visitors on weekdays and 150-200 visitors on weekends.	The Nouva Simonelli Appia 2 espresso machine is a premium coffee apparatus characterized by superior quality, cutting-edge technology, user-friendly operation, excellent post-purchase assistance, and straightforward upkeep. The Anfim Milano Dose grinder features substantial burrs for fast, uniform grinding. The Latina 600N grinder is compatible with manual brewing devices, like the Hario V60, Flat Bottom, and Cold Brew, to get superior brewing outcomes. This apparatus ensures that the caliber of the manufactured goods is already very good, although still below “SG”.	Location choice is crucial for corporate operations. LK was defeated in the competition because of its distance from the city center and limited access. Furthermore, the marketing and promotional efforts are insufficient. Only a limited number of individuals near the café are familiar with LK.

				Consequently, this café ceased operations in March 2024.
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Source: Author, 2025

4. DISCUSSION

Product innovation is essential for competitive advantage and sustainability, particularly within the coffee industry. If a café specializing in coffee beverages fails to innovate new product variations in response to consumer preferences, it is likely to fail. In addition to location and hygiene, consumer preferences articulated through product innovation are the primary requirements of this enterprise. The three situations examined indicate that innovating coffee machines requires careful observation and analysis. Entrepreneurs need to enhance their expertise and competencies in this domain, which then manifests in the product offerings available in their enterprise.

Adopting Richard Florida's theory (2003) on the creativity process of 3 coffee businesses, only 2 –AL and SG--survived because they carried out the four processes, namely (i) preparation, (ii) incubation, (iii) illumination, and (iv) verification, well. Meanwhile, for the third company, LK, it has not fulfilled the four stages because it is still in the "incubation" stage and has not entered the next stage. Market testing as an illumination stage and feedback, which is crucial for adjustment or revision according to market preferences, has not been done. Because the creativity process was incomplete, innovation as a goal of the coffee business and entrepreneurship in LK did not occur.

Those findings lead to the conclusion that the creativity process to generate innovation could not have happened if the four stages were not conducted well or were incomplete. In LK's case, location and promotion are the next crucial factors the company needs to observe, consider, and better assess in the third and fourth stages. Compared with the design thinking concept initially introduced by J.E. Arnold in the 1950s and subsequently developed and refined through the 1990s, as shown in Figure 3, Richard Florida's conceptual framework provides a more comprehensive approach. This includes feedback in the form of revisions or adjustments during the final stages of innovation development.

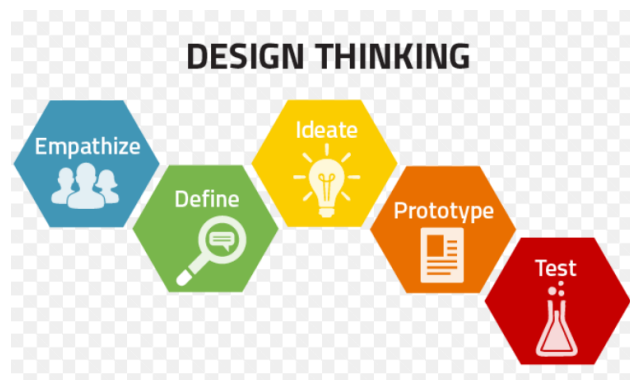


Figure 3 Design Thinking Concept

Source: Edmead, M., 2020

Although they may appear similar at first glance, the non-linear design thinking framework allows for adjustments following the test results at the end of a stage; however, any revision or modifications must restart from either the second stage “define”, or the third stage “ideate”. This distinction separates Florida’s conceptual framework of the creativity process from Arnold’s design thinking concept, both of which cultivate creative thinking skills and generate innovation.

Adopting technology to foster innovation can help expand the coffee sector by addressing rising demand for premium, ethically sourced, and sustainably produced coffee. In the innovation process, an entrepreneur or business proprietor may use a methodology akin to that established by Richard Florida. Technological advancement requires monitoring and implementation; however, it also demands other phases, including validation, market entry, assessment, and further review. This cycle recurs in the creative process to facilitate groundbreaking innovations. Consequently, the enterprise can endure and triumph in the rivalry.

The findings of this study provide several practical implications for entrepreneurs, coffee SMEs, policymakers, and organizations supporting the creative economy. First, technological innovation should be regarded as a strategic investment rather than merely an operational tool. Adopting modern coffee machines, digital ordering systems,

precision roasting technologies, and automated brewing equipment enables coffee businesses to improve production efficiency, maintain product consistency, and deliver higher service quality. These technological capabilities enhance customer satisfaction and strengthen business competitiveness in an increasingly dynamic market. Second, the study highlights that technological innovation alone is insufficient to ensure long-term business success. The three case studies show that sustainable competitive advantage emerges from integrating technological capability with entrepreneurial creativity, continuous product innovation, effective marketing strategies, and appropriate business location decisions. Entrepreneurs should therefore continuously evaluate market feedback and adapt their products and services to changing consumer preferences through an iterative innovation process consistent with Richard Florida's Creativity Process. Third, the findings suggest that coffee entrepreneurs should invest not only in production technology but also in developing human capital. Continuous training in coffee brewing techniques, equipment operation, digital marketing, customer experience management, and innovation management will enable employees and business owners to maximize the benefits of technological adoption while maintaining high product quality and operational efficiency.

From a policy perspective, government agencies and institutions supporting SMEs should encourage wider adoption of digital technologies through financial incentives, technology assistance programs, entrepreneurship training, and innovation incubation initiatives. Such support is particularly important for small and medium-sized coffee businesses that often face financial and technological constraints when upgrading their production systems.

Finally, this study demonstrates that technological innovation contributes not only to business performance but also to broader cultural transformation. Modern coffee businesses have become important spaces where technology, creativity, and consumer lifestyle intersect, creating new forms of social interaction and value creation. Therefore, stakeholders should promote technological advancement while preserving Indonesia's rich coffee heritage, local identity, and sustainable production practices. Balancing innovation with cultural preservation will strengthen the long-term resilience and international competitiveness of Indonesia's coffee industry.

5. CONCLUSIONS

The findings of this research suggest that technological advancements, especially in coffee machines and related apparatus, have profoundly propelled the progress and evolution of the coffee industry. Consequently, industry stakeholders are urged to embrace and implement cutting-edge technology in coffee machines and apparatus for the viability and prosperity of their enterprises. Furthermore, it is advisable to inform customers of the significance of local coffee and the cultural practices around coffee consumption to mitigate excessive consumerism. Consequently, it is anticipated that harmony will be established between modernization and cultural preservation, alongside heightened public awareness of coffee quality and the traditional values associated with coffee as a symbol of intimacy and social engagement.

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