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Article

How do social media-facilitated crowdsourcing and knowledge integration affect new product development? SME agile initiatives

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MARKETING | RESEARCH ARTICLE

How do social media-facilitated crowdsourcing and knowledge integration affect new product development? SME agile initiatives

Muhammad Dharma Tuah Putra Nasution^{1*}, Pipit Buana Sari¹, Henry Aspan¹, Yossie Rossanty¹, Irawan¹ and Hernawaty¹

Abstract: Crowdsourcing, which is a relatively new phenomenon, offers a variety of potential marketing initiatives for the future expansion of SMEs. The aim of this study is to analyze the impact of social media-facilitated crowdsourcing on the capability to integrate knowledge, which ultimately results in the development of new products. This study utilizes a quantitative-deductive approach. There were a total of 217 valid responses from owners and managers of SMEs who completed the questionnaire. The data was then analyzed using PLS. The evaluation of a quantitative model has revealed that the capability of social media-facilitated crowdsourcing has an impact on the knowledge integration capabilities of small and medium-scale enterprises (SMEs) and their initiatives for new product development.



Muhammad Dharma Tuah Putra Nasution

ABOUT THE AUTHORS

Muhammad Dharma Tuah Putra Nasution, a marketing researcher at Universitas Pembangunan Panca Budi, has made significant contributions to the field of marketing. His areas of expertise include entrepreneurial marketing, co-creation, crowdsourcing, and open innovation. Pipit Buana Sari is a committed researcher specializing in social media marketing, with a focus on the significant impact of social media on consumer behavior.

Henry Aspan, an esteemed associate professor, has made significant contributions to our understanding of legal aspects in the business world. Yossie Rossanty, a diligent market researcher, specializes in analyzing the impact of social media on consumer behavior, with a particular focus on areas such as social media influencers, customer relationship management, and brand equity.

Irawan is dedicated researcher in the field of finance, providing valuable insights on various financial topics, contributing to the advancement of the financial sector.

Hernawaty, an accomplished finance researcher, contributes to financial mechanisms and practices.

PUBLIC INTEREST STATEMENT

Our study explores how small and medium-sized enterprises (SMEs) can harness the power of crowdsourcing, a method of tapping into the collective wisdom of a diverse online community, to develop new and innovative products. Imagine your favorite local business having the ability to gather ideas and solutions from a vast online crowd to create products tailored to your needs and preferences.

We delve into how SMEs can not only gather ideas but also effectively integrate this external knowledge into their innovation processes. This means your neighborhood businesses can take advantage of the wealth of expertise available online to stay competitive and offer you cutting-edge products.

Our findings shed light on how SMEs, known for their agility, can leverage crowdsourcing and combine knowledge to thrive in a fast-paced market, ultimately benefiting consumers like you with better, more innovative products.

The authors also discuss additional empirical findings in the discussion section. The study has a few limitations that should be taken into account in future research. The study contributes to enriching the literature by providing empirical results that are rooted in knowledge-based views and practical lenses.

Subjects: Internet / Digital Marketing / e-Marketing; Marketing Communications; Marketing Management; Relationship Marketing; Retail Marketing; Services Marketing; Entrepreneurship and Small Business Management

Keywords: crowdsourcing capability; knowledge integration capability; social media; new product development. Smes

1. Introduction

The Digital 2023 Global Overview Report, released by DataReportal, highlights a significant increase in internet usage. Based on the report, the global user count has achieved a remarkable milestone of 5.16 billion, which represents approximately 64.4% of the global population. This growth, which can be attributed to a 1.9 percent increase in the past year, may be subject to potential delays in data reporting. Social media adoption is high, with 4.76 billion users globally, which represents nearly 60% of the world's population (Kemp, 2023). The social media user base in Indonesia is projected to reach a new peak of 267.75 million by 2028. The report also highlights the continuous growth of Indonesia's social media user base, with an additional 39 million users added between 2023 and 2028 (Statista, 2023).

Social media has also become a crucial tool for open innovation, as it provides businesses with access to external knowledge and expertise (Köhler et al., 2022). One primary method through which social media facilitates open innovation is by using "crowdsourcing," a term popularized by Howe (2006). Crowdsourcing entails the online solicitation of unspecified information and knowledge from a vast and diverse group of individuals through an "open call" (Brabham, 2013).

Crowdsourcing is a form of open innovation (OI), but it has distinct characteristics (Zhao & Zhu, 2012). Open innovation (OI) refers to the practice of utilizing external sources to foster innovation within an organization. On the other hand, crowdsourcing involves the act of gathering ideas, information, or services from a vast and unspecified group of individuals through online platforms (Cricelli et al., 2022).

SMEs face greater challenges compared to larger firms because of their limited resources (Acar, 2019; Van de Vrande et al., 2009), which makes SMEs difficult to explore and take advantage of alternative solutions (Albats et al., 2021). However, crowdsourcing enables SMEs to leverage their network and thereby discover untapped resources, surpassing their limitations (Kärkkäinen et al., 2010).

Previous studies have examined the concept of social media-facilitated crowdsourcing (Niu et al., 2019; Simula et al., 2015; Zhao & Zhu, 2012). However, the main objective of this study is to investigate how this type of crowdsourcing affects the knowledge integration capabilities of small and medium-scale enterprises (SMEs) in their efforts to develop new products. This study aims to assess SMEs from the perspective of the knowledge-based view (KBV), which emphasizes their crucial role in adapting to and incorporating the latest technological advancements (Grant & Phene, 2022). Their study proposes a comprehensive framework that delineates various types and processes of knowledge.

The capability to integrate knowledge is a vital aspect of product design, as it allows for the incorporation of insights from multiple sources (Madhavan & Grover, 1998). Small and medium-scale enterprises (SMEs) have the ability to utilize crowdsourcing and integrate both internal and

external sources of knowledge. However, the full potential of crowdsourcing as a method to access external knowledge sources for the development of superior new products is not yet fully explored (Faullant et al., 2017; Qin et al., 2016; Tran & Park, 2012).

In this context, it is necessary to explore strategic approaches that SMEs can utilize to enhance their capabilities in integrating knowledge and crowdsourcing for innovative product development. In order to make well-informed decisions, SMEs must possess empirically validated models that encompass concepts pertaining to capabilities in social media-facilitated crowdsourcing and knowledge integration. The primary aim of this study is to address these challenges and provide a significant contribution to the existing literature, specifically within the context of the knowledge-based view (KBV).

The remaining sections of this paper are organized as follows: firstly, an extensive literature review is presented, which is then followed by the development of hypotheses. Next, the research methodology is explained, followed by a discussion of the outcomes, findings, and conclusions.

2. Literature review

2.1. Knowledge based view (KBV)

The knowledge-based view emphasizes that firms should focus on integrating and applying knowledge, rather than solely on creating it (Grant, 1996). This perspective considers knowledge as an inherent attribute of individuals and explores how organizations integrate the specialized knowledge of their members. Zander and Kogut (1995) have made a significant contribution to the development of the knowledge-based view (KBV) as a theoretical framework that highlights the strategic significance of knowledge for organizations. The authors point out the significant impact of organizational principles on a company's capabilities, particularly in terms of the structure, coordination, and communication of individual and functional expertise. This perspective emphasizes the significance of knowledge transfer and the generation of novel ideas within organizations. Blackler (1995) argues that knowledge extends beyond mere information or data, encompassing dynamic, mediated, contextual, tentative, practical, and disputable processes. Firms utilize knowledge acquisition, creation, and practical application to drive innovation and develop new products (Martín-de Castro et al., 2011). Accordingly, the knowledge-based view emphasizes the relationship between knowledge integration, organizational principles, and innovation in firms.

2.2. Crowdsourcing

The evolution of crowdsourcing has given rise to various definitions (Hossain & Kauranen, 2015), which in turn have led to some misconceptions (Hopkins, 2011). Scholars have presented multiple definitions based on practical and theoretical frameworks (Zhao & Zhu, 2012). Others consider crowdsourcing as part of open innovation (Marjanovic et al., 2012; Seltzer & Mahmoudi, 2013; Wikhamn & Wikhamn, 2013), primarily discussed in the open innovation literature (Ebner et al., 2009; Schenk & Guittard, 2011).

Open innovation is a concept that centers around a company's innovation process, which entails engaging with various stakeholders, particularly customers (Chesbrough, 2003; Leimeister et al., 2009). Dahlander and Gann (2010) classified open innovation into three modes: Inbound OI, which involves acquiring external knowledge; Outbound OI, which entails sharing internal knowledge; and Coupled OI, which involves collaborative co-creation with partners (Ahn et al., 2017; Dubouloz et al., 2021).

In contrast, crowdsourcing has a broader scope (Zhao & Zhu, 2012) and can encompass a range of tasks (Nakatsu et al., 2014). It relies on anonymous members of the crowd (Schenk et al., 2019) and represents the relationship between an organization and a diverse crowd supported by the Internet (Zhao & Zhu, 2012). Contemporary definitions emphasize an online problem-solving

model called crowdsourcing, which uses the collective intelligence of online communities to achieve business objectives. Crowdsourcing involves distributing challenges through open calls to undefined contributors, engaging the crowd for various reasons (Brabham, 2013).

Crowdsourcing is generally more effective than internal sourcing for problem-solving (Afuah & Tucci, 2012). However, it is important to consider relevant factors for focal agents, such as individuals, groups, or organizations. The factors that need to be considered include the nature of the problem, the specific challenges faced by the focal entity, the appropriateness of different crowds, and the ease of evaluating the final solution (Afuah & Tucci, 2012).

Füller et al. (2014) have categorized crowdsourcing into four fundamental principles. The first principle highlights the effectiveness of large-scale collaboration, such as that observed in online communities, in effectively matching highly productive crowdsolvers with specific challenges. Furthermore, the idea of “swarm intelligence” and the utilization of collective knowledge (Boudreau & Lakhani, 2013), which incorporates insights from individuals who may not be specialists in the field, frequently exceeds the information derived from internal sources (Lakhani & Jeppesen, 2007). The third principle takes into account the consequences of selection. In this case, a small group of contributors provides viable, high-quality solutions, while others contribute comments and conduct testing (Füller et al., 2014). Typically, individuals with high levels of skill engage in complex tasks that align with their abilities, while those with lower skills tend to perform simple tasks. The fourth principle relates to the division and aggregation of tasks. The design of tasks and motivation strategies plays a significant role in individuals’ participation and engagement in the crowdsourcing process (Zheng et al., 2011).

2.3. Knowledge integration capability

Grant (1996) emphasizes the significance of knowledge transfer, which includes the processes of transmitting and receiving information. The acquisition of knowledge is influenced by the ability of individuals and organizations to absorb information (Cohen & Levinthal, 1990). It is important to note that tacit knowledge (knowing how) is disclosed via application, whereas explicit knowledge (knowing about) is exposed through communication (Grant, 1996). Knowledge integration refers to a firm’s capacity to effectively organize and utilize both recently acquired knowledge and pre-existing knowledge (Caridi-Zahavi et al., 2016). Knowledge management encompasses the exchange, acquisition, and application of knowledge within a firm. It is an essential capability that facilitates the gathering, sharing, and utilization of information across different departments (Eslami et al., 2018; Lyu et al., 2022; Zahra et al., 2020).

Zahra et al. (2020) emphasize the significance of knowledge sources in their collaborative supports, as well as the critical role of actors in the processes of identifying, integrating, and utilizing acquired knowledge. Accordingly, knowledge integration pertains to the process of reorganizing the existing knowledge within a firm to enhance mechanisms for product development. In their study, Sun et al. (2021) present three distinct viewpoints regarding the process of knowledge integration. These perspectives are categorized based on the origin of knowledge, the characteristics of knowledge, and the requirements for effective knowledge integration. Therefore, the authors suggest that cultivating systematization, socialization, and collaboration skills is crucial for effectively integrating knowledge.

The existing body of research has underscored the significance of knowledge integration capability. This pertains to the firm’s capacity to address challenges, reorganize and disseminate fresh knowledge, and integrate both new and pre-existing knowledge (Salunke et al., 2019; Yang et al., 2021). Firms with adequate knowledge integration capabilities are adept at seamlessly incorporating new knowledge into their existing knowledge base (Enkel et al., 2018). Furthermore, these firms play a crucial role in facilitating the transfer of knowledge and assisting in the development of effective knowledge strategies (Xi et al., 2020). The firm’s

ability to integrate knowledge relies on its acquisition and utilization of external sources of knowledge. This emphasizes the significance of behavior within the knowledge integration mechanism (Huang & Li, 2017; Yang et al., 2021).

2.4. The correlation between the capability of crowdsourcing and the capability of knowledge integration

Crowdsourcing refers to the utilization of the collective intelligence of a large group through online platforms to enhance knowledge and promote innovation (Füller et al., 2014). This approach offers several benefits, including enhanced diversity, reduced costs, and increased efficiency (Qin et al., 2016; Zahay et al., 2018). The process involves integrating various sources of knowledge, resulting in the generation of innovative ideas (Leiponen & Helfat, 2010). The effectiveness of the process depends on the quality and consistency of crowd contributions (O'Hern et al., 2022), as well as the design of the task and the motivation of the participants (Zheng et al., 2011). Zhong et al. (2018) emphasize the significant potential of crowdsourcing in generating innovative and user-friendly products. Furthermore, the successful implementation of this approach necessitates addressing obstacles such as intellectual property concerns and establishing efficient management strategies (Qin et al., 2016).

Füller et al. (2014) argue that social media can function as a platform for crowdsourcing, enabling individuals to access specialized knowledge. Small and medium-scale enterprises (SMEs) have the option to utilize crowdsourcing as a strategic approach to tackle the challenges they encounter during the development of new products. One way to tackle these challenges is by using an open crowdsourcing platform to efficiently distribute information to a wide online audience. Social media platforms facilitate the engagement of individuals with specialized knowledge or crowdsolvers, thereby promoting the development of effective problem-solving solutions. According to Afuah and Tucci (2012), crowdsourcing is a preferred approach for internal problem-solving because it enables firms to acquire customized solutions. It is crucial for the firm to have the ability to identify the problem at hand, meticulously select individuals from the crowd who can provide solutions, and assess their level of expertise (Füller et al., 2014). Several factors play a crucial role in the success of crowdsourcing initiatives. These factors encompass the essential knowledge and expertise, the qualifications of the participants, the firm's capability to motivate and retain their involvement, and the firm's capacity to assess and choose the most appropriate option (Afuah & Tucci, 2012).

2.5. New product development initiatives

New product development is crucial for ensuring long-term sustainability in firms, particularly for organizations that are innovative and have a significant impact on the market (Ganesan et al., 2005; Lyu et al., 2022; Morgan et al., 2019). In a highly competitive environment, firms must efficiently undertake new product development initiatives. Innovation and speed are two crucial factors for the accomplishment of new product development (Fang, 2008; Sheng et al., 2013). They help firms respond quickly to customer needs, differentiate themselves from competitors, and achieve long-term sustainability (Cheng & Yang, 2019; Cooper, 2019).

Cicea et al. (2015) emphasize the importance of carefully planning and managing each phase of the new product development process, which comprises seven interrelated phases. Human capital, organizational capital, and customer capital are critical factors in new product development as they facilitate customer involvement and enhance product performance (Chen et al., 2014). Human capital refers to the knowledge, skills, and abilities possessed by the development team. On the other hand, organizational capital refers to the resources and capabilities of the firm (Sun et al., 2021). Customer capital refers to the knowledge and insights acquired from customer interactions during the product development process (Yoon et al., 2023).

Networking capability is crucial for the performance of new product development, as it involves the identification and management of network relationships (Fang et al., 2019). This capability

involves fostering strong ties, engaging in frequent interactions with each partner, and maintaining long-term relationships. Piątkowska (2022) emphasizes the notable influence of social media on the process of developing new products, as it has the ability to affect various stages of the process. Social media is a valuable resource in the new product development process, and leveraging its potential for co-creation is essential for achieving long-term sustainability.

2.6. The correlation between the capability to integrate knowledge and initiatives for new product development

Knowledge integration is a critical capability within organizations that supports the development of new products (Corallo et al., 2012; Eslami et al., 2018; Hong et al., 2004; Tsai et al., 2015). This process involves the exchange, acquisition, and application of both new and pre-existing knowledge (Bao et al., 2012; Kraaijenbrink et al., 2006). The integration of knowledge involves the exchange, acquisition, and application of knowledge, which is crucial for firms to gather, share, and utilize (Eslami et al., 2018; Liu, 2021; Zahra et al., 2020).

The synchronization of internal and external knowledge sources is crucial for enhancing the productivity and profitability of new product development (Tzabbar et al., 2013). According to scholars, the reevaluation of outdated ideas and the adoption of new approaches can greatly stimulate the process of developing new products (Liu, 2021; Zhan et al., 2020).

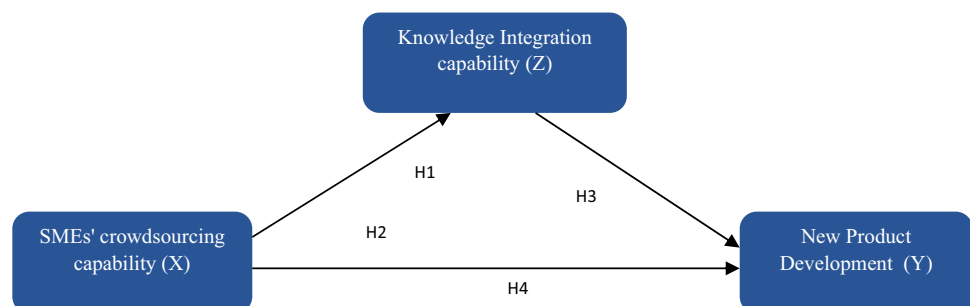
According to Morgan et al. (2019), organizations can effectively access the most current information and stay updated on evolving customer demands and expectations by integrating various external sources of knowledge. Caridi-Zahavi et al. (2016) emphasize the significance of integrating external sources of knowledge in the development of new products. They argue that firms that effectively integrate and learn from these external sources can leverage their newfound knowledge to expedite the introduction of innovative ideas into the market. Hence, knowledge integration stands as a pivotal organizational capability that facilitates the acquisition, dissemination, and utilization of knowledge for the purpose of developing innovative products. The conceptual framework is presented in Figure 1.

3. Hypotheses development and conceptual framework

3.1. The crowdsourcing capability and knowledge integration capability of SMEs

Crowdsourcing capability refers to a firm's ability to effectively utilize crowdsourcing as a channel for acquiring knowledge and resources for innovation (Pollok et al., 2019). This involves outsourcing business responsibilities to a crowd, facilitated by information technologies (Nevo & Kotlarsky, 2020; Prpić et al., 2015). The capability of crowdsourcing involves not just investing in crowdsourcing activities, but also seamlessly integrating the acquired knowledge into the internal innovation processes of the firm (Cricelli et al., 2022; Karachiwalla & Pinkow, 2021; Ruiz & Beretta, 2021). Without proper integration of knowledge, crowdsourcing efforts are futile (Dahlander et al., 2019; Pollok et al., 2019).

Figure 1. Conceptual Framework.



On the other hand, the capability of knowledge integration refers to the ability to transform external knowledge into valuable insights and innovations (Acharya et al., 2022). It includes absorptive capacity and the ability to recognize, absorb, and commercially use the value of external knowledge (Pollok et al., 2019). Knowledge integration complements crowdsourcing by effectively integrating the knowledge of the crowd into a firm's innovation processes (Salunke et al., 2019). Crowdsourcing and knowledge integration play a crucial role in driving innovation (Pollok et al., 2019).

Several studies have been conducted to investigate the correlation between crowdsourcing capability and knowledge integration capability in small and medium-scale enterprises (SMEs). For instance, Kmiecik et al. (2012) discovered a positive correlation between innovation activity in small and medium-scale enterprises (SMEs) and the utilization of information technology (IT) in internal communications. This finding suggests that having a strong IT capability can enhance knowledge sharing and collaboration within the organization. Salisu and Bakar (2019) have identified that organizational relational capability enables SMEs to develop and utilize interfirm collaborations, resulting in enhanced integration of internal and external knowledge. Li et al. (2023) discovered that internet platforms facilitate the integration and sharing of knowledge among SMEs, thereby enhancing their effectiveness in achieving digital transformation. Therefore, SMEs that have the ability to access external knowledge and expertise through crowdsourcing may possess higher capabilities for integrating knowledge. Based on these findings, it can be inferred that there is a notable correlation between the ability to crowdsource and the integration of knowledge in small and medium-scale enterprises (SMEs). This inference serves as the foundation for the subsequent hypothesis.

H1: The capability of SME crowdsourcing positively correlates with the capability of knowledge integration

3.2. The capability of SMEs in crowdsourcing and their initiatives for new product development

Crowdsourcing is the process by which small and medium-scale enterprises (SMEs) acquire services, ideas, or content from a large group of individuals, commonly referred to as the "crowd" (Qin et al., 2016). The integration of additive manufacturing technology can significantly impact the process of new product development (NPD) for small and medium-scale enterprises (SMEs). It enables these businesses to expand their design and manufacturing capabilities, access a broader pool of skilled professionals and knowledge, and improve their overall efficiency and speed. Crowdsourcing has revolutionized the process and technology of new product development (NPD), enabling small and medium-scale enterprises (SMEs) to gain access to an extensive range of perspectives and ideas. This has led to the development of more innovative and creative product designs (Qin et al., 2016).

Crowdsourcing has the potential to enhance the efficiency and speed of the new product development (NPD) process for small and medium-scale enterprises (SMEs). By leveraging online platforms, SMEs can swiftly gather design ideas, feedback, and solutions from a substantial number of individuals. Boldbaatar and Choi (2022) argue that this process speeds up the ideation and prototyping phases of product development, making it easier for small and medium-scale enterprises (SMEs) to bring new products to the market faster. Crowdsourcing provides cost-effective solutions for small and medium-scale enterprises (SMEs) by enabling them to access the knowledge and skills of a crowd. This eliminates the necessity of hiring additional employees or outsourcing to external firms (Niu et al., 2019).

Crowdsourcing helps small and medium-scale enterprises (SMEs) overcome barriers in the new product development (NPD) process. This is due to the fact that SMEs have less bureaucracy and are more agile compared to larger firms (Rahman & Ramos, 2010). SMEs can obtain market feedback, identify emerging trends, and collect innovative ideas by interacting with the crowd

(Devece et al., 2019). This approach, which focuses on the needs and preferences of customers, enhances the chances of achieving successful product launches. Based on the arguments presented, this study suggests that the capability of crowdsourcing has a significant impact on new product development initiatives. Consequently, the proposed relationship is hypothesized as follows:

H2: The capability of SME crowdsourcing positively correlates with initiatives for new product development.

3.3. The capability to integrate knowledge and the initiatives for new product development

Knowledge integration is a crucial element of the new product development process. It enables organizations to effectively merge and utilize knowledge from various sources to enhance performance (Marsh & Stock, 2006). The determining factors are the extent of available knowledge and its specialization (Ferreira et al., 2020), as well as the impact of firm-specific attributes such as capabilities, behavior, and culture (Chatterjee et al., 2021). Cui et al. (2020) have identified firm-specific characteristics that contribute to the capability of integrating knowledge.

Small and medium-scale enterprises (SMEs) play a crucial role in new product development as they possess the capacity to efficiently leverage specific resources and capabilities, thus overcoming any limitations in resources. According to Quaye and Mensah (2019), this integration allows managers to adapt and improve their skills in response to evolving customer demands by utilizing innovative marketing tools.

Li et al. (2023) emphasize the importance of knowledge integration capability in new product development. This capability enables companies to effectively respond to new situations, nurture creativity, and foster the creation of innovative products. Teams have the ability to cultivate innovative behavior by effectively integrating fragmented knowledge and subsequently reorganizing it into a cohesive new knowledge system.

In their study, Rosell et al. (2017) examine and describe the knowledge integration strategies employed by firms to incorporate external knowledge from suppliers. It is observed that firms engage in deliberate decision-making when they participate in collaborative projects. Frishammar et al. (2012) emphasize the importance of knowledge integration activities in the context of new product development. These activities aim to enhance existing technology, enable the utilization of new skills and capabilities, and improve the capacity to capitalize on opportunities. The evidence collectively supports the critical role of knowledge integration in the process of developing new products. Therefore, the proposed relationship is as follows:

H3: The capability of SMEs to integrate knowledge is positively related to their initiatives in new product development

3.4. The mediation effect of knowledge integration capability

Crowdsourcing capability pertains to an organization's capacity in effectively leveraging external crowds for a multitude of purposes, such as new product development, idea acquisition, solution generation, and feedback gathering (Pollok et al., 2019). This practice involves gathering contributions from a large group of individuals through online platforms, which encourages innovation and facilitates the development of new products (Faullant et al., 2017). The capability of integrating organizational knowledge refers to an organization's ability to effectively incorporate and utilize knowledge from both internal members and external sources. This capability entails the coordination and collaboration with individuals who possess diverse expertise (Grant, 1996).

The relationship between crowdsourcing capability and new product development is mediated by organizational knowledge integration capability. The effectiveness of crowdsourcing in driving new product development outcomes depends on how well crowdsourced knowledge is integrated into an organization's existing knowledge base and operational processes (Jiao et al., 2022). Design crowdsourcing, a specialized form of crowdsourcing that focuses on product design, has a positive impact on the performance of new products. According to Pollok et al. (2019), the efficient coordination of crowdsourcing activities and effective collaboration with external crowdsourcing service providers are essential factors in enhancing open innovation performance.

Xu (2015) highlights the importance of knowledge management capabilities, such as knowledge acquisition, transformation, and application, in driving organizational innovation and performance in new product development. These capabilities enable organizations to optimally utilize knowledge, emphasizing the significance of integrating knowledge within the context of innovation and new product development.

Xi et al. (2020) conducted a study to investigate the relationship between organizational unlearning, knowledge integration capability, and knowledge transfer in cross-border mergers and acquisitions. The findings suggest that the ability to integrate knowledge serves as a mediator between unlearning within an organization and the transfer of knowledge.

Thus, this underscores the significance of integrating knowledge to facilitate knowledge transfer and, ultimately, contribute to the development of new products. These studies provide support for the notion that the capability of integrating organizational knowledge acts as a mediator in the relationship between crowdsourcing capability and the development of new products. Therefore, the hypothesis that is being proposed is:

H4: The relationship between crowdsourcing capability and new product development is mediated by the capability to integrate knowledge.

4. Methodology

4.1. Research design

The research design for this study is a quantitative-deductive approach, employing surveys and questionnaires to test research hypotheses (Sekaran & Bougie, 2016). The target population is SMEs located in Medan, North Sumatera Province, Indonesia, which is known for its economic potential and significant contribution to the Gross Domestic Product (GDP) (Nasution et al., 2021; Rafiki et al., 2023). The study uses purposive sampling with the unrestricted self-selected survey method to select elements in the population based on specific criteria, considering them to represent the overall population (Burns & Veeck, 2020; Malhotra et al., 2017).

The survey was conducted between January and May 2022, with the assistance of enumerators who distributed and collected responses from the participants through mobile phones or WhatsApp. Out of the 300 potential respondents contacted, 217 business owners and managers completed the survey, resulting in a response rate of 73.33 percent. All the respondents reported using social media for various marketing purposes, such as promoting products, providing customer service, collecting feedback on launched products, and generating ideas or innovations for new product development.

PLS-SEM was employed to analyze the relationship between constructs, a soft modeling approach that makes no assumptions about data distribution. PLS-SEM is a robust method for handling non-normality and small sample sizes, and is particularly well-suited for analyzing complex models. However, it is not a universal solution for all empirical research challenges

(Hair et al., 2021). Smart-PLS-SEM was utilized to analyze the data, meeting the minimum PLS-SEM requirement of 10 times the largest number of structural paths leading to a specific latent construct in the structural model (Hair et al., 2021).

Control variables play a crucial role in research methodology, as they help isolate the effect of independent variables on dependent variables. However, not all research methods utilize control variables, and their improper use can have several negative consequences. Some risks associated with the inappropriate use of control variables include an increased risk of several type errors, making marginal effect sizes appear significant, leading to a potential for biased results (Sturman et al., 2022). A small sample size can further reduce statistical power, making analysis difficult to interpret. As a result, a larger sample size is typically required when using control variables to control for the effects of other variables.

In conclusion, the authors carefully considered excluding control variables in this study, taking into account the proposed research model and avoiding introducing bias in the findings.

4.2. Measurement

The study highlights the significance of employing reliable and valid response scales in survey development in order accurately evaluate the attitudes of respondents. The study employed a five-point Likert scale, which has been demonstrated to yield greater reliability and validity in comparison to response scales containing fewer than five or more than nine points (Krosnick & Presser, 2010). Behavioral science research typically treats Likert scales as interval data in order to arrive at valid and informative conclusions. Conducting sound statistical analyses is crucial in order to obtain statistically valid results (Bishop & Herron, 2015).

The questionnaire used in the study comprised two parts: one that focused on the specific characteristics of the sample, and the other that addressed the constructs of the study. The evaluation criteria were anchored on a five-point Likert scale, which ranged from 1 (strongly disagree) to 5 (strongly agree). The Indonesian version of the scale was developed using standardized translation and retranslation procedures. The measurement of crowdsourcing capability was conducted using a four-dimensional latent construct, as outlined by Afuah and Tucci (2012). On the other hand, knowledge integration capability was assessed through four items that were derived from prior research studies, such as those conducted by Gold et al. (2001), Yang et al. (2021), and Xi et al. (2020). The authors, Ma et al. (2012), utilized a measurement scale comprising of four items in order to evaluate new product development initiatives. These items, as outlined in Table 1. Overall, this study adheres to standardized procedures in order to generate valid and informative research findings, thereby contributing to the advancement of knowledge in a specific field.

4.3. Data analysis

The study employed structural equation modeling, specifically utilizing the partial least squares (PLS) software for analyzing a research model. PLS is chosen because of its ability to handle complex models with multiple constructs and structural paths, even when dealing with non-normal residual distributions. It is also known for its ability to generate strong causal predictions and validate hypothesized relationships (Hair et al., 2019).

The study conducted a comprehensive examination of common-method variance (CMV) and potential nonresponse biases. This was followed by a two-step approach to create a measurement model that assessed construct reliability, convergent validity, and discriminant validity. The research hypotheses were scrutinized using variance-based partial least squares structural equation modeling (PLS-SEM) with a five-point scale for measurement.

The authors employed PLS-SEM to analyze data that exhibited a non-multivariate normal distribution. The study utilized the STATCAL online tool to evaluate the skewness and kurtosis of the

indicators. The results indicate that the p-values of the Mardia coefficients were below 0.05 (see. Table 2), suggesting a deviation from the assumption of multivariate normality. Therefore, PLS-SEM was used in this study, which was supported by the statistical evidence.

5. Results

5.1. Sample-specific characteristics

The Table 3 below presents an overview of the specific characteristics of the data sample, which consisted of 217 participants.

In Table 3, the survey results show that the sample consisted of 99 women (45.6%) and 118 men (54.37%) as respondents. It is evident from the data that the majority of business owners and managers in this study are men.

In terms of business type distribution, the findings indicate that the largest group consisted of coffee shop owners and managers, with a total of 57 participants (26.27%). The culinary sector had 52 participants (23.96%), closely followed by fashion or similar businesses with 47 participants (21.66%). Furthermore, there were 42 individuals (19.35%) involved in furniture or similar businesses. Lastly, a smaller proportion was made up of other retail business owners and managers, totaling 19 individuals (8.76%).

Upon analyzing the educational background of the respondents, it is evident that 82 individuals (37.79%) had completed high school, while 72 individuals (33.1%) possessed a bachelor's degree. Additionally, 37 respondents (17.05%) had obtained a diploma-level education, while 26 individuals (11.98%) had pursued postgraduate studies.

In regards to the income levels of the small and medium-scale enterprises (SMEs) in the study, it was found that 99 participants (45.62%) reported earning less than IDR 500 million. The next income bracket, which ranges from IDR 1.51 billion to IDR 2.5 billion, consisted of 41 participants, accounting for 18.89% of the total. Notably, only three participants (1.38%) were associated with SMEs that generated gross income above IDR 2.5 billion.

Based on the data, the primary reason why SMEs use social media is for selling their goods and services. This accounts for 33.64% of the respondents, which is equivalent to 73 samples. Following closely behind is the promotion of goods and services, with 28.57% or 62 small and medium enterprises (SMEs) utilizing social media for this purpose.

On the other hand, the least frequently cited reason among SMEs for utilizing social media is to gather ideas and innovations for new product development. This accounts for a mere 10.14%, equivalent to 22 samples. Within this category, the proportion further breaks down as follows: 14.29% (31 samples) rely on internal sources, while 13.36% (29 samples) are looking to external sources.

In terms of generating ideas and innovations for new product development, the majority, specifically 43.78%, originates from internal sources. This suggests that SMEs primarily depend on their internal expertise and knowledge. Hybrid sources, which incorporate both internal and external inputs, account for 34.56% of the total, specifically comprising 75 samples. In contrast, external sources contribute the lowest percentage, which is 21.66%, involving 47 SMEs.

5.2. Common method variance bias

The full collinearity test method was introduced by Kock and Lynn (2012) in order to detect common method bias in PLS-SEM. Kock (2015) suggests that a Full Collinearity VIF value exceeding 3.3 may indicate bias. However, the current study found that all VIF values were below 3.3, which indicates the absence of any common method bias. The full collinearity test method was utilized to evaluate common method bias, as depicted in Table 4.

Table 1. Measurement scale

Constructs	Items measurement	Sources
Crowdsourcing capability	<ol style="list-style-type: none"> 1. We are able to determine the specific characteristics that must be possessed. 2. We are able to find and reach the right crowdsolvers. 3. We are able to determine the type of special knowledge that crowdsolvers should have. 4. We are able to identify the problem. 5. We are able to turn problems into specific questions. 6. We are able to solve problems. 7. We are able to invite many crowdsolvers to participate. 8. We are able to stimulate crowdsolvers to do the best they can for us. 9. We are able to effectively evaluate crowdsolvers' ideas about usability. 10. We are able to develop criteria before evaluating ideas from the crowdsolvers. 11. We let the right crowdsolvers pick useful ideas 	Afuah and Tucci (2012)
Knowledge integration capability	<ol style="list-style-type: none"> 1) On social media, we are willing to share our experiences and learn new knowledge from outside sources. 2) On social media, we are able to absorb knowledge from external partners. 3) On social media, our company is able to combine old and new knowledge from both inside and outside the company. 4) On social media, our company is able to integrate various kinds of knowledge. 	Gold et al. (2001), Xi et al. (2020), Yang et al. (2021).
New Product Development Initiatives	<ol style="list-style-type: none"> 1. In general, the company is able to accept new ideas for products. 2. In general, the company is able to produce creative new products. 3. In general, the company is able to develop attractive new products. 4. In general, the company is able to commercialize the new product. 	Ma et al. (2012)

Table 2. Assessment of multivariate normality using Mardia Coefficients

Test	Mardia Coefficient	p-value	Results
Skewness	2448.671748	0.000	No
Kurtosis	29.6677141	0.000	No

Table 3. Sample-specific characteristics

No	Specific characteristics	Frequency	Proportion
1	Gender		
	Women	99	45.62%
	Men	118	54.37%
	Total	217	100
2	Type of Business		
	Furniture	42	19.35%
	Fashion & shoes	47	21.66%
	Other retail	19	8.76%
	Coffee shop	57	26.27%
	Culinary	52	23.96%
	Total	217	100
3	Education Level		
	High school or equivalent	82	37.79%
	Diploma	37	17.05%
	Bachelor	72	33.18%
	Postgraduate	26	11.98%
	Total	217	100
4	Business income		
	Below IDR 500 million	99	45.62%
	IDR 501 million—IDR 1.5 Billion	74	34.10%
	IDR 1.51 Billion—IDR 2.5 Billion	41	18.89%
	Above IDR 2.5 Billion	3	1.38%
	Total	217	100
5	Reasons for companies to use social media		
	Promotion of goods and services	62	28.57%
	Get ideas and innovation for new product development.	22	10.14%
	Customer feedback	31	14.29%
	Find and reach new customers.	29	13.36%
	Product sales service	73	33.64%
	Total	217	100
6	Source of ideas and innovation for the company's new product development		
	Internal sources	95	43.78%
	External source	47	21.66%
	Combination	75	34.56%
	Total	217	100

5.3. Non-response bias

Table 5 presents the results of an independent sample t-test, which was conducted to test the possibility of non-response bias in the study. According to the guidelines of Armstrong and Overton (1977), it can be observed that Levene's test indicated no significant difference in the homogeneity of variances between early and late responses for each variable.

5.4. Measurement model

The psychometric properties of the model were assessed for reliability and validity through the utilization of Cronbach's alpha (CA), DG-Rho, and composite reliability (CR). The CA values ranged between 0.837 and 0.941, the DG-Rho values ranged from 0.891 to 0.949, and the CR values ranged between 0.839 and 0.942. However, values that exceed 0.95 should be approached with caution as they may indicate semantic redundancy caused by similar phrasing of items. Factor loadings (FL) were utilized in order to evaluate the reliability of the indicators. The study found that all FL values exceeded the acceptable threshold of 0.7, which indicates satisfactory indicator reliability (see Figure 2). Convergent validity was assessed by calculating the average variance extracted (AVE), adhering to Hair et al. (2019) recommended threshold of 0.5 or above. As shown in Table 6, all AVE values met the established criteria satisfactorily.

Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait (HTMT) ratio of correlations (Henseler et al., 2015). In Table 7, the diagonal values represent the square root of AVE, whereas the off-diagonal values represent the square of correlations, which range from 0.792 to 0.825.

Notably, all diagonal values exceeded their corresponding off-diagonal values in both rows and columns. This observation provides evidence of well-established discriminant validity (Hair et al., 2021). Furthermore, according to the HTMT matrix (Table 8), it is evident that all correlation ratios (ranging from 0.725 to 0.818) do not meet the stringent criterion of 0.85, as suggested by Kline (2023). This further strengthens the evidence supporting discriminant validity.

5.5. Structural model

The structural model was thoroughly evaluated, considering various crucial aspects. These include assessing its predictive accuracy (R^2), predictive relevance (Q^2), effect size (f^2), and checking for multicollinearity. The R^2 measure was used to assess the model's ability to explain variance and evaluate its explanatory power. Based on the results presented in Table 9, the structural model effectively explains 53.2 percent of the variance in KIC and 50.6 percent of the variance in NPD. Furthermore, the predictive relevance of the model was assessed using a blindfolding procedure. It was observed that all Q^2 values surpassed 0, indicating that the model satisfied the requirements for predictive relevance in both KIC ($Q^2 = 0.337$) and NPD ($Q^2 = 0.325$).

In order to investigate the relationships between the exogenous and endogenous constructs, this study utilized the effect size (f^2). According to the benchmarks provided by Hair et al. (2021), the analysis demonstrated that SCC had a significant influence on KIC, with a large effect size ($f^2 = 1.135$), suggesting a robust correlation. In contrast, the impact of SCC on NPD was relatively minor, as indicated by a small effect size ($f^2 = 0.109$). Furthermore, KIC demonstrated a moderate effect on NPD ($f^2 = 0.172$), indicating a reasonably significant influence. Finally, the assessment took into account multicollinearity by utilizing the variance inflation factor (VIF) (see Table 10). It has been

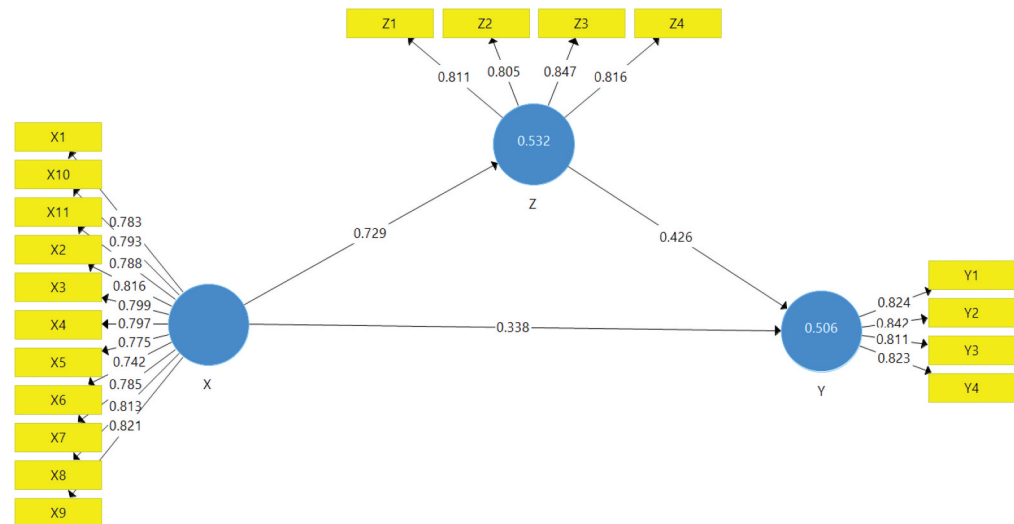
Table 4. Full collinearity VIFs

Constructs	Common Method Bias
SMEs' Crowdsourcing Capability	2.340
Knowledge Integration Capability	2.483
New Product Development Initiatives	2.013

Table 5. Assessment of non-response bias using independent samples t-test

Latent Variable	Response Type	N	Mean	SD	Levene's Test for Equality of Variances		t-test for Equality of Means			
					F	Sig.	T	df	Sig. (2-tailed)	
SCC	Early Response	193	3.61187	0.87851	1.06621	0.30296	-0.5894	31.66416		0.55977
	Late Response	24	3.70833	0.73951						
KIC	Early Response	193	3.63212	0.9014	0.65206	0.42027	-0.4246	30.35302		0.67412
	Late Response	24	3.70833	0.81982						
NPD	Early Response	193	3.58161	0.88433	0.04181	0.83818	-0.63777	29.75584		0.5285
	Late Response	24	3.69792	0.83724						

Figure 2. Outer model.



determined that the VIF values (ranging from 1.000 to 2.135) adhere to the acceptable threshold of 3.3, indicating the absence of significant multicollinearity issues within the model.

5.6. Hypotheses testing using PLS-SEM

Statistical significance was assessed by employing bootstrapping with 5,000 resamples. The results presented in Table 11 support the direct effect from SCC to KIC ($\beta = 0.729$; $t = 11.851$) and from SCC to NPD ($\beta = 0.338$; $t = 2.825$). Therefore, there is strong statistical evidence supporting H1 and H2. Similarly, the direct effect from KIC to NPD ($\beta = 0.426$; $t = 3.709$) was also confirmed, suggesting a statistically significant positive impact of KIC on NPD. Therefore, statistical support exists for H3.

Furthermore, the study provides additional confirmation of the statistical significance of the indirect effect from SCC to NPD via KIC ($\beta = 0.310$; $t = 3.531$). The mediation effect was assessed by calculating the variance accounted for (VAF). The results presented in Table 12 indicate that a VAF value of 48% supports the partial mediation of KIC in the relationship between SCC and NPD. Therefore, H4 is supported. This compelling evidence underscores the significant effect of SCC on NPD, which is accomplished through the mediation of KIC.

6. Discussions and implications

This section focuses on the primary aim of the study, which is to examine how social media-enabled crowdsourcing affects the knowledge integration capabilities and new product development of small and medium-scale enterprises (SMEs). The analysis was conducted on a sample of 217 respondents who exclusively utilize social media for marketing purposes. The tested model demonstrates that crowdsourcing capability is a second-order construct that impacts both knowledge integration capability and SMEs' initiatives for new product development.

The analysis results provide evidence supporting the first hypothesis (H1), which proposes a positive correlation between the crowdsourcing capability of small and medium-scale enterprises (SMEs) and their ability to integrate knowledge. The correlation coefficient of 0.729 indicates a robust and statistically significant positive association between these two capabilities. The calculated t-value of 11.851 and the associated p-value of 0.000 provide solid evidence for the statistical significance of the relationship and the reliability of the findings. The study highlights the significant impact of SMEs' crowdsourcing capability on facilitating knowledge integration capability. The findings indicate that small and medium-scale enterprises (SMEs) with higher capacities for crowdsourcing are more likely to integrate a variety of knowledge sources via social media platforms.

Table 6. Measurement model (construct reliability, convergent validity and collinearity)							
Constructs	Code	Item-loading	CA	CR	DG rho	AVE	VIF
SMEs' Crowdsourcing Capability	SCC1	0.783	0.941	0.942	0.949	0.628	2.467
	SCC2	0.816					2.364
	SCC3	0.799					2.259
	SCC4	0.797					2.581
	SCC5	0.775					2.322
	SCC6	0.742					2.396
	SCC7	0.785					2.228
	SCC8	0.813					1.994
	SCC9	0.821					2.371
	SCC10	0.793					2.681
	SCC11	0.788					2.706
Knowledge Integration Capability	KIC1	0.811	0.837	0.844	0.895	0.672	1.801
	KIC2	0.805					1.775
	KIC3	0.847					2.036
	KIC4	0.816					1.802
New Product Development Initiatives	NPD1	0.824	0.844	0.839	0.891	0.681	1.811
	NPD2	0.842					2.063
	NPD3	0.811					1.785
	NPD4	0.823					1.827

Table 7. Discriminant validity using Fornell-Larcker criterion

Latent Variable	SCC	KIC	NPD
SCC	0.792		
KIC	0.649	0.825	
NPD	0.729	0.672	0.820

Notes: Square-root of AVE is shown in boldface on diagonal.

Table 8. Discriminant validity using heterotrait-monotrait ratio (HTMT)

Latent Variable	SCC	KIC	NPD
SCC			
KIC	0.725		
NPD	0.818	0.798	

Table 9. Predictive accuracy and relevance

Variable	Predictive Accuracy		Predictive Relevance
	R ²	Adjusted R ²	Q ²
KIC	0.532	0.530	0.337
NPD	0.506	0.501	0.325

Table 10. Effect size and multicollinearity

Variables	f ² (Effect Size)	
	KIC	NPD
SCC	1.135	0.109
KIC		0.172
	Multicollinearity (VIF <3.3)	
	KIC	NPD
SCC	2.135	1.000
KIC		2.135

The result suggests that crowdsourcing can enhance the accessibility and utilization of relevant knowledge sources. The abundance of knowledge has positively influenced knowledge integration (Leiponen & Helfat, 2010). As the availability of additional knowledge increases, the likelihood of finding a suitable solution also increases. This improves the knowledge integration capacities of SMEs.

The second rationale for the results indicates that crowdsourcing produces knowledge that is more precise, relevant, and practical. Crowdsourcing facilitates the gathering of a wide array of knowledge possessed by individuals within a crowd. Füller et al. (2014) suggest that utilizing social media and external sources of knowledge increases the likelihood of uncovering valuable insights for specific issues. The practical value of integrating knowledge is enhanced when crowdsolvers are able to provide appropriate answers. SMEs can maximize the advantages of knowledge integration by leveraging valuable solutions generated by crowdsolvers.

Table 11. Hypothesis testing using Latent Variable scores

Direct Effect	Beta	STDEV	t-statistics	p-values	Decision
SCC -> KIC	0.729	0.062	11.851	0.000	Supported
SCC -> NPD	0.338	0.120	2.825	0.002	Supported
KIC -> NPD	0.426	0.115	3.709	0.000	Supported
Indirect Effect					
SCC -> KIC-> NPD	0.310	0.088	3.531	0.000	Supported

Notes: ***Significance at 1%, **significance at 05% and *significance at 10% level of confidence.

Table 12. VAF estimates for the role of KIC as a mediator

Independent Variable	Dependent Variable	Mediating variable	Indirect effect	Total effect	VAF (%)	Result
SCC	NPD	KIC	0.311	0.649	48%	Partial mediation

The correlation analysis conducted on variables related to small and medium-scale enterprises' (SMEs) crowdsourcing capability and new product development reveals a positive correlation between these factors. The correlation coefficient of 0.338 indicates that there is a positive relationship between participation in SMEs' crowdsourcing capability and the probability of successful new product development. The t-value of 2.825 and the associated p-value of 0.002 confirm the statistical significance of this relationship. The empirical data and correlation analysis strongly support the second hypothesis (H2), which suggests a positive correlation between the crowdsourcing capability of SMEs and new product development.

SMEs with strong crowdsourcing capabilities have a competitive advantage in generating unique product ideas, evaluating different designs, and successfully launching new products. These capabilities are attained through processes that involve identifying the essential attributes of the solver, reaching out to appropriate solvers, and ascertaining the specific expertise needed. This finding is consistent with the insights discussed by Afuah and Tucci (2012). By engaging a large number of participants and motivating them to contribute their best efforts, SMEs can leverage the collective intelligence of a diverse group to generate outstanding ideas and detect potential issues at an earlier stage in the development process. Setting criteria before evaluating solvers' ideas and selecting the most suitable solvers can aid SMEs in choosing the most appropriate ideas for new products and increasing the likelihood of achieving commercial success.

The data and analysis confirm the correlation between knowledge integration capability and new product development, supporting hypothesis H3. The correlation coefficient of 0.426 indicates a moderate positive correlation between the two variables. The statistical significance of the relationship is supported by the t-value of 3.709 and the p-value of 0.000. This evidence strongly supports the hypothesis. These findings emphasize the significance of knowledge integration capability in facilitating innovation and new product development in small and medium-scale enterprises. This highlights the importance of effectively utilizing diverse knowledge sources to enhance organizational learning and creativity.

Social media can facilitate knowledge integration for small and medium-scale enterprises (SMEs). SMEs can enhance their product development capacity by engaging in activities such as sharing experiences, acquiring new knowledge from external sources, assimilating knowledge from

external partners, and integrating various types of knowledge from both internal and external sources. This enables them to align their new products with consumer preferences. The motivation for new product development stems from the imperative need to fulfill consumer expectations (Qin et al., 2016). Furthermore, existing literature indicates that the capacity of small and medium-scale enterprise (SME) owner-managers to successfully incorporate knowledge into the process of product development is a vital determinant in achieving high-quality products (Verona & Ravasi, 2003). Small and medium-scale enterprises (SMEs) can leverage the knowledge and creativity of diverse individuals, both internal and external to their organization, to create the most optimal solutions for their customers.

The correlation analysis found a significant positive correlation ($r = 0.310$) between SMEs' crowdsourcing capability and new product development, with knowledge integration capability acting as a mediator. This implies that the ability to integrate knowledge acts as a mediator, enabling the link between SMEs' crowdsourcing capability and the advancement of new products. Furthermore, the obtained t-value of 3.531 and the associated p-value of 0.000 provide strong evidence of the statistical significance of this relationship. The empirical data and correlation analysis strongly support the fourth hypothesis (H4). This hypothesis proposes that the relationship between small and medium-scale enterprises' (SMEs) capability to crowdsource and their development of new products is influenced by their capability to integrate knowledge.

This study provides robust evidence supporting the hypothesis that the capability to integrate knowledge serves as a mediator between SMEs' crowdsourcing capability and the innovation of new products. One argument in favor of this hypothesis is that crowdsourcing expands the pool of relevant knowledge available to small and medium-scale enterprises (SMEs). Through the utilization of social media-facilitated crowdsourcing, small and medium-scale enterprises (SMEs) can tap into the vast knowledge of crowdsolvers. This valuable expertise can be seamlessly incorporated into their new product development initiatives. As a result, SMEs are more likely to find suitable solutions and generate innovative ideas, which improves their ability to integrate knowledge. Another reason supporting the hypothesis is that crowdsourcing produces knowledge that is both specific and applicable for small and medium-scale enterprises (SMEs). SMEs can access a diverse range of knowledge from crowdsolvers through the use of crowdsourcing. This increases the likelihood of discovering valuable ideas and solutions for specific issues. The practical value of knowledge integration capability is enhanced when crowdsolvers offer relevant and useful solutions. By harnessing the knowledge and ingenuity of a diverse workforce, small and medium-scale enterprises (SMEs) can broaden their range of product ideas and increase their capacity to develop innovative and appealing new products. The process involves identifying solver characteristics, contacting suitable solvers, and determining required specialized knowledge.

6.1. Theoretical implications

First and foremost, this study sheds light on the significance of crowdsourcing in SMEs as a valuable approach to expand knowledge by tapping into the collective expertise and insights of a diverse crowd. Through this collaborative method, SMEs can leverage collective intelligence to generate innovative new products. The empirical evaluation of a model provides substantial evidence supporting the crucial connections between crowdsourcing capability, SMEs' knowledge integration capability, and their endeavors in new product development.

This highlights that the absorption of knowledge is contingent on the SMEs capability to integrate both new and existing knowledge. Thus, the results of this study contribute to the existing evidence and corroborate the knowledge-based view (Grant, 1996), which can serve as a fundamental basis for scholars and academics in developing customized crowdsourcing models specifically tailored for SMEs.

Moreover, the research highlights that social media supports task completion through crowdsourcing. Although it was documented as a crowdsourcing principle (Füller et al., 2014),

crowdsolvers requires further development to implement collaborative problem solving. Collaboration between customers and the “virtual mass” or “crowdmarket” is essential for new product development and innovation (Nambisan, 2002). This underscores the critical importance of engaging the virtual mass through crowdsourcing practices on social media platforms.

6.2. Practical implications

An important implication for practitioners is the finding that the crowdsourcing capabilities of the SMEs involved primarily focus on key aspects of crowdsourcing capability. Consequently, SMEs have the ability to integrate their knowledge, resulting in new product development initiatives that meet customer expectations for increasingly innovative and appealing products. Practitioners should understand that the capability of SME crowdsourcing is defined, first and foremost, as the ability to effectively communicate the challenges presented to the crowdmarket. Secondly, it is important to possess the ability to comprehend the specific nature of knowledge needed, encompassing the necessary competencies and qualifications of the individuals participating in crowdsolving. Thirdly, business owners and managers possess a clear understanding of the necessary efforts required to effectively promote the crowdmarket, both prior to and throughout the crowdsourcing process. Furthermore, business owners and managers possess the knowledge and expertise necessary to effectively assess and select the most appropriate and judicious course of action.

7. Conclusion

Crowdsourcing, a term initially coined in 2006, has become a popular method for small and medium-scale enterprises (SMEs) to leverage the collective intelligence of a vast number of individuals at a minimal cost. It is used in marketing activities such as product management, communication management, and marketing research. However, it is crucial for SMEs to be aware of both the advantages and disadvantages of crowdsourcing, as well as the potential challenges it may present. Factors such as the number and qualifications of contributors, the risk of intellectual property, and the complexity of coordinating knowledge from diverse sources should be considered.

SMEs can effectively leverage crowdsourcing and knowledge management practices to foster innovation, facilitate organizational learning, and achieve sustainable growth and long-term success. The incorporation of these practices can generate a competitive advantage, allowing small and medium-scale enterprises (SMEs) to remain pertinent and competitive in a swiftly evolving business environment. This study adds to the current body of literature on social media-facilitated crowdsourcing for the new product development initiatives of small and medium-scale enterprises (SMEs) in Indonesia. It highlights the importance of integrating knowledge through crowdsourcing to enhance new product development initiatives. The empirical results lend support to the knowledge-based view of the firm. The results also suggest that the utilization of social media for crowdsourcing can prove to be a valuable tool for small and medium-scale enterprises (SMEs) seeking to enhance their new product development processes and broaden their marketing endeavors.

7.1. Research limitations

This study provides valuable insights into the correlation between the capability of crowdsourcing, the capability of knowledge integration, and the development of new products in SMEs. However, there are certain limitations that need to be addressed. One limitation to consider is the relatively small sample size of 217 business owners and managers. It is important to note that this sample may not accurately represent all small and medium-scale enterprises (SMEs) that operate in the digital environment. Additionally, it is important to mention that this study's scope is limited to the province of North Sumatera. As a result, the generalizability of the findings to the entire country of Indonesia may be limited. Another limitation is the absence of control variables, which potentially could have influenced the relationship between the variables of interest.

7.2. Future research directions

Future studies should consider expanding the sample size in order to investigate the relationship between crowdsourcing capability, knowledge integration capability, and new product development in various countries. Including control variables and examining the moderating effects of variables such as firm size and industry type can enhance our understanding of how these factors influence new product development in small and medium-scale enterprises (SMEs). Addressing the limitations of this study and conducting further research can assist scholars and business practitioners in gaining a better understanding of how social media-based crowdsourcing practices can support marketing initiatives in SMEs.

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References

- Acar, O. A. (2019). Motivations and solution appropriateness in crowdsourcing challenges for innovation. *Research Policy*, 48(8), 103716. <https://doi.org/10.1016/j.respol.2018.11.010>
- Acharya, C., Ojha, D., Gokhale, R., & Patel, P. C. (2022). Managing information for innovation using knowledge integration capability: The role of boundary spanning objects. *International Journal of Information Management*, 62, 102438. <https://doi.org/10.1016/j.jinfomgt.2021.102438>
- Afuah, A., & Tucci, C. (2012). Crowdsourcing as a solution to distant search. *Academy of Management Review*, 37(3), 355–375. <https://doi.org/10.5465/amr.2010.0146>
- Ahn, J. M., Minshall, T., & Mortara, L. (2017). Understanding the human side of openness: The fit between open innovation modes and CEO characteristics. *R&D Management*, 47(5), 727–740. <https://doi.org/10.1111/radm.12264>
- Albats, E., Podmetina, D., & Vanhaverbeke, W. (2021). Open innovation in SMEs: A process view towards business model innovation. *Journal of Small Business Management*, 1–42. <https://doi.org/10.1080/00472778.2021.1913595>
- Armstrong, J. S., & Overton, T. S. (1977). Estimating non-response bias in mail surveys. *Journal of Marketing Research*, 14(3), 396–402. <https://doi.org/10.1177/002224377701400320>
- Bao, Y., Sheng, S., & Zhou, K. Z. (2012). Network-based market knowledge and product innovativeness. *Marketing letters*, 23, 309–324.
- Bishop, P. A., & Herron, R. L. (2015). Use and misuse of the Likert item responses and other ordinal measures. *International Journal of Exercise Science*, 8(3), 297.
- Blackler, F. (1995). Knowledge, knowledge work and organizations: An overview and interpretation. *Organization Studies*, 16(6), 1021–1046. <https://doi.org/10.1177/017084069501600605>
- Boldbaatar, D., & Choi, D. (2022). Design crowdsourcing supply chain in short life cycle products. In *SHS Web of Conferences* (Vol. 132, p. 01015). EDP Sciences. <https://doi.org/10.1051/shsconf/202213201015>
- Boudreau, K., & Lakhani, K. (2013). Using the crowd as an innovation partner. *Harvard Business Review*, 91(4), 60–69.
- Brahm, D. (2013). *Crowdsourcing*. The MIT Press. <https://doi.org/10.7551/mitpress/9693.001.0001>
- Burns, A. C., & Veeck, A. (2020). *Marketing research* (Ninth ed.). Pearson Education Limited.
- Caridi-Zahavi, O., Carmeli, A., & Arazy, O. (2016). The influence of CEOs' visionary innovation leadership on the performance of high-technology ventures: The mediating roles of connectivity and knowledge integration. *Journal of Product Innovation Management*, 33(3), 356–376. <https://doi.org/10.1111/jpim.12275>
- Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2021). Knowledge sharing in international markets for product and process innovation: Moderating role of firm's absorptive capacity. *International Marketing Review*. <https://doi.org/10.1108/IMR-11-2020-0261>
- Cheng, C., & Yang, M. (2019). Creative process engagement and new product performance: The role of new product development speed and leadership encouragement of creativity. *Journal of Business Research*, 99, 215–225. <https://doi.org/10.1016/j.jbusres.2019.02.067>
- Chen, C. J., Liu, T. C., Chu, M. A., & Hsiao, Y. C. (2014). Intellectual capital and new product development. *Journal of Engineering and Technology Management*, 33, 154–173. <https://doi.org/10.1016/j.jengtecman.2014.06.003>
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.
- Cicea, C., Marinescu, C., & Moroiu, N. (2015). Innovation process and business functions' implication in the new product development process. *Proceedings of the International Management Conference*, 9(1), 227–233.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152. <https://doi.org/10.2307/2393553>

- Cooper, R. G. (2019). The drivers of success in new-product development. *Industrial Marketing Management*, 76, 36–47. <https://doi.org/10.1016/j.indmarman.2018.07.005>
- Corallo, A., Lazoi, M., & Secundo, G. (2012). Inter-organizational knowledge integration in collaborative NPD projects: Evidence from the aerospace industry. *Knowledge Management Research & Practice*, 10(4), 354–367. <https://doi.org/10.1057/kmrp.2012.25>
- Cricelli, L., Grimaldi, M., & Vermicelli, S. (2022). Crowdsourcing and open innovation: A systematic literature review, an integrated framework and a research agenda. *Review of Managerial Science*, 16(5), 1269–1310. <https://doi.org/10.1007/s11846-021-00482-9>
- Cui, T., Tong, Y., Teo, H., & Li, J. (2020). Managing knowledge distance: IT-Enabled inter-firm knowledge capabilities in collaborative innovation. *Journal of Management Information Systems*, 37(1), 217–250. <https://doi.org/10.1080/07421222.2019.1705504>
- Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699–709. <https://doi.org/10.1016/j.respol.2010.01.013>
- Dahlander, L., Jeppesen, L. B., & Piezunka, H. (2019). How organizations manage crowds: Define, broadcast, attract, and select. In *Managing inter-organizational collaborations: Process views* (pp. 239–270). Emerald Publishing Limited. <https://doi.org/10.1108/S0733-558X20190000064016>
- Devece, C., Palacios, D., & Ribeiro-Navarrete, B. (2019). The effectiveness of crowdsourcing in knowledge-based industries: The moderating role of transformational leadership and organisational learning. *Economic research-Ekonomska istraživanja*, 32(1), 335–351. <https://doi.org/10.1080/1331677X.2018.1547204>
- Dubouloz, S., Bocquet, R., Equey Balzli, C., Gardet, E., & Gandia, R. (2021). SMEs' open innovation: Applying a barrier approach. *California Management Review*, 64(1), 113–137. <https://doi.org/10.1177/00081256211052679>
- Ebner, W., Leimeister, J. M., & Krcmar, H. (2009). Community engineering for innovations: The ideas competition as a method to nurture a virtual community for innovations. *R&D Management*, 39(4), 342–356. <https://doi.org/10.1111/j.1467-9310.2009.00564.x>
- Enkel, E., Groemminger, A., & Heil, S. (2018). Managing technological distance in internal and external collaborations: Absorptive capacity routines and social integration for innovation. *The Journal of Technology Transfer*, 43(5), 1257–1290. <https://doi.org/10.1007/s10961-017-9557-0>
- Eslami, M. H., Lakemond, N., & Brusoni, S. (2018). The dynamics of knowledge integration in collaborative product development: Evidence from the capital goods industry. *Industrial Marketing Management*, 75, 146–159. <https://doi.org/10.1016/j.indmarman.2018.05.001>
- Fang, E. (2008). Customer participation and the trade-off between new product innovativeness and speed to market. *Journal of Marketing*, 72(4), 90–104. <https://doi.org/10.1509/jmkg.72.4.090>
- Fang, G., Zhou, Q., Wu, J., & Qi, X. (2019). The relationship between network capabilities and innovation performance: Evidence from Chinese high-tech industry. *Industrial Management & Data Systems*, 119(8), 1638–1654. <https://doi.org/10.1108/imds-02-2019-0060>
- Faullant, R., Füller, J., & Hutter, K. (2017). Fair play: Perceived fairness in crowdsourcing competitions and the customer relationship-related consequences. *Management Decision*, 55(9), 1924–1941. <https://doi.org/10.1108/MD-02-2017-0116>
- Ferreira, J., Coelho, A., & Moutinho, L. (2020). Strategic alliances, exploration and exploitation and their impact on innovation and new product development: The effect of knowledge sharing. *Management Decision*, 59(3), 524–567. <https://doi.org/10.1108/md-09-2019-1239>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/00224378101800104>
- Frishammar, J., Lichtenthaler, U., & Rundquist, J. (2012). Identifying technology commercialization opportunities: The importance of integrating product development knowledge. *Journal of Product Innovation Management*, 29(4), 573–589. <https://doi.org/10.1111/j.1540-5885.2012.00926.x>
- Füller, J., Lemmer, S., & Hutter, K. (2014). Crowdsourcing: How social media and the wisdom of the crowd change future companies. In *Management of the fuzzy front end of innovation* (pp. 243–249). Springer International Publishing. https://doi.org/10.1007/978-3-319-01056-4_22
- Ganesan, S., Malter, A. J., & Rindfleisch, A. (2005). Does distance still matter? Geographic proximity and new product development. *Journal of Marketing*, 69(4), 44–60. <https://doi.org/10.1509/jmkg.2005.69.4.44>
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214. <https://doi.org/10.1080/07421222.2001.11045669>
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(52), 109–122. <https://doi.org/10.1002/smj.4250171110>
- Grant, R., & Phene, A. (2022). The knowledge based view and global strategy: Past impact and future potential. *Global Strategy Journal*, 12(1), 3–30. <https://doi.org/10.1002/gsj.1399>
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications. <https://doi.org/10.1007/978-3-030-80519-7>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hong, P., Doll, W. J., Nahm, A. Y., & Li, X. (2004). Knowledge sharing in integrated product development. *European Journal of Innovation Management*, 7(2), 102–112. <https://doi.org/10.1108/14601060410534393>
- Hopkins, R. (2011). What is crowdsourcing. In P. Sloane (Ed.), *A Guide to Open Innovation and Crowdsourcing: Advice from Leading Experts in the Field* (pp. 5–14). Kogan Page Publishers.
- Hossain, M., & Kauranen, I. (2015). Crowdsourcing: A comprehensive literature review. *Strategic Outsourcing: An International Journal*, 8(1), 2–22. <https://doi.org/10.1108/SO-12-2014-0029>
- Howe, J. (2006). The rise of crowdsourcing. *Wired Magazine*, 14(6), 1–4.

- Huang, J.-W., & Li, Y.-H. (2017). Green innovation and performance: The view of organizational capability and social reciprocity. *Journal of Business Ethics*, 145(2), 309–324. <https://doi.org/10.1007/s10551-015-2903-y>
- Jiao, Y., Wu, Y., & Hao, L. (2022). Does crowdsourcing lead to better product design: The moderation of network connectivity. *Journal of Business & Industrial Marketing*, 37(3), 594–611. <https://doi.org/10.1108/JBIM-04-2020-0213>
- Karachiwalla, R., & Pinkow, F. (2021). Understanding crowdsourcing projects: A review on the key design elements of a crowdsourcing initiative. *Creativity and Innovation Management*, 30(3), 563–584. <https://doi.org/10.1111/caim.12454>
- Kärkkäinen, H., Jussila, J., & Väisänen, J. (2010). Social media use and potential in Business-to-Business companies' innovation. *14th International Academic MindTrek Conference: Envisioning Future Media Environments* (pp. 228–236). Tampere, Finland: ACM. <https://doi.org/10.1145/1930488.1930536>
- Kemp, S. (2023). Digital 2023: Global overview report. *Datareportal*. <https://datareportal.com/reports/digital-2023-global-overview-report/>
- Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.
- Kmieciak, R., Michna, A., & Meczynska, A. (2012). Innovativeness, empowerment and IT capability: Evidence from SMEs. *Industrial Management & Data Systems*, 112(5), 707–728. <https://doi.org/10.1108/02635571211232280>
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration*, 11(4), 1–10. <https://doi.org/10.4018/ijec.2015100101>
- Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, 13(7), 546–580. <https://doi.org/10.17705/1jais.00302>
- Köhler, J., Sönnichsen, S. D., & Beske-Jansen, P. (2022). Towards a collaboration framework for circular economy: The role of dynamic capabilities and open innovation. *Business Strategy and the Environment*, 31(6), 2700–2713. <https://doi.org/10.1002/bse.3000>
- Kraaijenbrink, J., Faran, D., & Hauptman, A. (2006). Knowledge integration by SMEs—framework. In *Knowledge integration* (pp. 17–28). Physica-Verlag HD. https://doi.org/10.1007/3-7908-1681-7_2
- Krosnick, J. A., & Presser, S. (2010). Question and Questionnaire Design. In P. V. Marsden & J. D. Wright (Eds.), *Handbook of survey research* (2nd ed., pp. 263–313). Emerald Group Publishing.
- Lakhani, K., & Jeppesen, L. (2007). Getting unusual suspects to solve R&D puzzles. *Harvard Business Review*, 85(5), 30–32.
- Leimeister, J. M., Huber, M., Bretschneider, U., & Krcmar, H. (2009). Leveraging crowdsourcing: Activation-supporting components for IT-based ideas competition. *Journal of Management Information Systems*, 26(1), 197–224. <https://doi.org/10.2753/MIS0742-1222260108>
- Leiponen, A., & Helfat, C. (2010). Innovation objectives, knowledge sources, and the benefits of breadth. *Strategic Management Journal*, 31(2), 224–236. <https://doi.org/10.1002/smj.807>
- Liu, B. (2021). Matching external search strategies with radical and incremental innovation and the role of knowledge integration capability. *Baltic Journal of Management*, 16(5), 765–784. <https://doi.org/10.1108/BJM-05-2021-0184>
- Li, H., Yang, Z., Jin, C., & Wang, J. (2023). How an Industrial internet platform empowers the digital transformation of SMEs: Theoretical mechanism and Business model. *Journal of Knowledge Management*, 27(1), 105–120. <https://doi.org/10.1108/jkm-09-2022-0757>
- Lyu, C., Zhang, F., Ji, J., Teo, T. S., Wang, T., & Liu, Z. (2022). Competitive intensity and new product development outcomes: The roles of knowledge integration and organizational unlearning. *Journal of Business Research*, 139, 121–133. <https://doi.org/10.1016/j.jbusres.2021.09.049>
- Madhavan, R., & Grover, R. (1998). From embedded knowledge to embodied knowledge: New product development as knowledge management. *Journal of Marketing*, 62(4), 1–12. <https://doi.org/10.1177/002224299806200401>
- Malhotra, N. K., Nunan, D., Birks, D. F., & Wills, P. (2017). *Marketing research: An applied approach* (Fifth Edit ed.). Pearson Education Limited.
- Marjanovic, S., Fry, C., & Chataway, J. (2012). Crowdsourcing based business models: In search of evidence for innovation 2.0. *Science and Public Policy*, 39(3), 318–332. <https://doi.org/10.1093/scipol/scs009>
- Marsh, S. J., & Stock, G. N. (2006). Creating dynamic capability: The role of intertemporal integration, knowledge retention, and interpretation. *Journal of Product Innovation Management*, 23(5), 422–436. <https://doi.org/10.1111/j.1540-5885.2006.00214.x>
- Martin-de Castro, G., López-Sáez, P., Delgado-Verde, M., & Martín-de Castro, G. (2011). Towards a knowledge-based view of firm innovation. Theory and empirical research. *Journal of Knowledge Management*, 15(6), 871–874. <https://doi.org/10.1108/13673271111179253>
- Ma, C., Yang, Z., Yao, Z., Fisher, G., & Fang, E. E. (2012). The effect of strategic alliance resource accumulation and process characteristics on new product success: Exploration of international high-tech strategic alliances in China. *Industrial Marketing Management*, 41(3), 469–480. <https://doi.org/10.1016/j.indmarman.2011.04.001>
- Morgan, T., Anokhin, S. A., Song, C., & Chistyakova, N. (2019). The role of customer participation in building new product development speed capabilities in turbulent environments. *International Entrepreneurship & Management Journal*, 15(1), 119–133. <https://doi.org/10.1007/s11365-018-0549-9>
- Nakatsu, R. T., Grossman, E. B., & Iacovou, C. L. (2014). A taxonomy of crowdsourcing based on task complexity. *Journal of Information Science*, 40(6), 823–834. <https://doi.org/10.1177/0165551514550140>
- Nambisan, S. (2002). Designing virtual customer environments for new product development: Toward a theory. *Academy of Management Review*, 27(3), 392–413. <https://doi.org/10.2307/4134386>
- Nasution, M. D. T. P., Rafiki, A., Lubis, A., & Rossanty, Y. (2021). Entrepreneurial orientation, knowledge management, dynamic capabilities towards e-commerce adoption of SMEs in Indonesia. *Journal of Science and Technology Policy Management*, 12(2), 256–282. <https://doi.org/10.1108/JSTPM-03-2020-0060>
- Nevo, D., & Kotlarsky, J. (2020). Crowdsourcing as a strategic sourcing phenomenon: Critical review and insights for future research. *Journal of Strategic Information Systems*, 29(4), 101593. <https://doi.org/10.1016/j.jsis.2020.101593>
- Niu, X. J., Qin, S. F., Vines, J., Wong, R., & Lu, H. (2019). Key crowdsourcing technologies for product design and development. *International Journal of Automation &*

- Computing, 16(1), 1–15. <https://doi.org/10.1007/s11633-018-1138-7>
- O'Hern, M., Akdeniz, B., & Du, S. (2022). The effects of crowdsourcing contribution type and temporal consistency on new product development success. *R&D Management*, 52(1), 126–138. <https://doi.org/10.1111/radm.12481>
- Piętkowska, B. (2022). Value co-creation on Public Social Media at different stages of the new product development process. A case study of a Polish clothes Manufacturer. *Journal of Marketing and Consumer Behaviour in Emerging Markets*, 14(1), 40–51.
- Pollok, P., Lüttgens, D., & Piller, F. T. (2019). How firms develop capabilities for crowdsourcing to increase open innovation performance: The interplay between organizational roles and knowledge processes. *Journal of Product Innovation Management*, 36(4), 412–441. <https://doi.org/10.1111/jpim.12485>
- Prpić, J., Shukla, P. P., Kietzmann, J. H., & McCarthy, I. P. (2015). How to work a crowd: Developing crowd capital through crowdsourcing. *Business Horizons*, 58(1), 77–85. <https://doi.org/10.1016/j.bushor.2014.09.005>
- Qin, S., Van der Velde, D., Chatzakis, E., McStea, T., & Smith, N. (2016). Exploring barriers and opportunities in adopting crowdsourcing based new product development in manufacturing SMEs. *Chinese Journal of Mechanical Engineering*, 29(6), 1052–1066. <https://doi.org/10.3901/CJME.2016.0808.089>
- Quaye, D., & Mensah, I. (2019). Marketing innovation and sustainable competitive advantage of manufacturing SMEs in Ghana. *Management Decision*, 57(7), 1535–1553. <https://doi.org/10.1108/md-08-2017-0784>
- Rafiki, A., Nasution, M. D. T. P., Rossanty, Y., & Sari, P. B. (2023). Organizational learning, entrepreneurial orientation and personal values towards SMEs' growth in Indonesia. *Journal of Science and Technology Policy Management*, 14(1), 181–212. <https://doi.org/10.1108/JSTPM-03-2020-0059>
- Rahman, H., & Ramos, I. (2010). Open innovation in SMEs: From closed boundaries to networked paradigm. *Issues in Informing Science and Information Technology*, 7(4), 471–487. <https://doi.org/10.28945/1221>
- Rosell, D. T., Lakemond, N., & Melander, L. (2017). Integrating supplier knowledge in new product development projects: Decoupled and coupled approaches. *Journal of Knowledge Management*, 21(5), 1035–1052. <https://doi.org/10.1108/jkm-10-2016-0438>
- Ruiz, E., & Beretta, M. (2021). Managing internal and external crowdsourcing: An investigation of emerging challenges in the context of a less experienced firm. *Technovation*, 106, 102290. <https://doi.org/10.1016/j.technovation.2021.102290>
- Salisu, Y., & Bakar, L. J. A. (2019). Technological capability, relational capability and firms' performance: The role of learning capability. *Revista de Gestão*, 27(1), 79–99.
- Salunke, S., Weerawardena, J., & McColl-Kennedy, J. R. (2019). The central role of knowledge integration capability in service innovation-based competitive strategy. *Industrial Marketing Management*, 76, 144–156. <https://doi.org/10.1016/j.indmarman.2018.07.004>
- Schenk, E., & Guittard, C. (2011). Towards a characterization of crowdsourcing practices. *Journal of Innovation Economics*, 7(1), 93–107. <https://doi.org/10.3917/jie.007.0093>
- Schenk, E., Guittard, C., & Pénin, J. (2019). Open or proprietary? Choosing the right crowdsourcing platform for innovation. *Technological Forecasting and Social Change*, 144, 303–310. <https://doi.org/10.1016/j.techfore.2017.11.021>
- Sekaran, U., & Bougie, R. (2016). *Research methods for Business: A skill-building approach* (7th ed.). John Wiley & Sons Ltd.
- Seltzer, E., & Mahmoudi, D. (2013). Citizen participation, open innovation, and crowdsourcing: Challenges and opportunities for planning. *Journal of Planning Literature*, 28(1), 3–18. <https://doi.org/10.1177/0885412212469112>
- Sheng, S., Zhou, K. Z., & Lessassy, L. (2013). NPD speed vs. innovativeness: The contingent impact of institutional and market environments. *Journal of Business Research*, 66(11), 2355–2362. <https://doi.org/10.1016/j.jbusres.2012.04.018>
- Simula, H., Töllmen, A., & Karjaluo, H. (2015). Facilitating innovations and value co-creation in Industrial B2B firms by Combining digital Marketing, social media and crowdsourcing. In: L. Robinson (Ed.) *Marketing Dynamism & Sustainability: Things Change, Things Stay the Same . . . Developments in Marketing Science: Proceedings of the Academy of Marketing Science*. Springer, Cham. https://doi.org/10.1007/978-3-319-10912-1_84
- Statista. (2023). *Number of Social Media Users in Indonesia from 2019 to 2028*. Retrieved June 10, 2023, from <https://www.statista.com/forecasts/1144743/social-media-users-in-indonesia/>
- Sturman, M. C., Sturman, A. J., & Sturman, C. J. (2022). Uncontrolled control variables: The extent that a researcher's degrees of freedom with control variables increases various types of statistical errors. *Journal of Applied Psychology*, 107(1), 9. <https://doi.org/10.1037/apl0000849>
- Sun, X., Zhao, D., Zhang, D., & Tian, F. (2021). Entrepreneurship and sustainable innovation capabilities in platform enterprises: The mediating role of knowledge integration. *Chinese Management Studies*, 16(3), 627–652. <https://doi.org/10.1108/CMS-04-2021-0175>
- Tran, A., & Park, J. (2012). Crowd participation pattern in the phases of a product development process that utilizes crowdsourcing. *Industrial Engineering & Management Systems*, 11(3), 266–275. <https://doi.org/10.7232/iems.2012.11.3.266>
- Tsai, K. H., Liao, Y. C., & Hsu, T. T. (2015). Does the use of knowledge integration mechanisms enhance product innovativeness? *Industrial Marketing Management*, 46, 214–223. <https://doi.org/10.1016/j.indmarman.2015.02.030>
- Tzabbar, D., Aharonson, B. S., & Amburgey, T. L. (2013). When does tapping external sources of knowledge result in knowledge integration? *Research Policy*, 42(2), 481–494. <https://doi.org/10.1016/j.respol.2012.07.007>
- Van de Vrande, V., de Jong, J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SME's: Trends and management challenges. *Technovation*, 6(7), 423–437. <https://doi.org/10.1016/j.technovation.2008.10.001>
- Verona, G., & Ravasi, D. (2003). Unbundling dynamic capabilities: An exploratory study of continuous product innovation. *Industrial and Corporate Change*, 12(3), 577–606. <https://doi.org/10.1093/icc/12.3.577>
- Wikhamn, B., & Wikhamn, W. (2013). Structuring of the open innovation field. *Journal of Technology Management & Innovation*, 8(3), 173–185. <https://doi.org/10.4067/S0718-27242013000400016>
- Xi, Y., Wang, X., & Zhu, Y. (2020). Organizational unlearning and knowledge transfer in cross-border M&As: The mediating role of knowledge integration from

- a routine-based view. *Journal of Knowledge Management*, 24(4), 841–860. <https://doi.org/10.1108/JKM-08-2019-0419>
- Xu, S. (2015). A study on knowledge management capabilities towards new product innovation type and development performance of Chinese businesses. *Acta Oeconomica*, 65(s2), 145–157.
- Yang, M., Wang, J., & Yang, J. (2021). Boundary-spanning search, knowledge integration capability and sustainable competitive advantage. *Baltic Journal of Management*, 16(3), 446–464. <https://doi.org/10.1108/BJM-08-2020-0314>
- Yoon, S., Kim, G., Chung, Y., & Son, H. (2023). Is customer involvement always beneficial for R&D efficiency? The difference between high-tech and low-tech industries. *Managerial and Decision Economics*, 44(3), 1678–1688.
- Zahay, D., Sihi, D., Hajli, N., & Pollitte, W. (2018). The efficacy of crowdsourcing for Early-stage new product development: An abstract. In *Boundary Blurred: A Seamless Customer Experience in Virtual and Real Spaces: Proceedings of the 2018 Academy of Marketing Science (AMS) Annual Conference* 46 (pp. 491–492). Springer International Publishing. https://doi.org/10.1007/978-3-319-99181-8_158
- Zahra, S. A., Neubaum, D. O., & Hayton, J. (2020). What do we know about knowledge integration: Fusing micro-and macro-organizational perspectives. *Academy of Management Annals*, 14(1), 160–194. <https://doi.org/10.5465/annals.2017.0093>
- Zander, U., & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science*, 6(1), 76–92. <https://doi.org/10.1287/orsc.6.1.76>
- Zhan, Y., Tan, K. H., Chung, L., Chen, L., & Xing, X. (2020). Leveraging social media in new product development: Organisational learning processes, mechanisms and evidence from China. *International Journal of Operations & Production Management*, 40(5), 671–695. <https://doi.org/10.1108/IJOPM-04-2019-0318>
- Zhao, Y., & Zhu, Q. (2012). Evaluation on crowdsourcing research: Current status and future direction. *Information Systems Frontiers*, 16(3), 417–434. <https://doi.org/10.1007/s10796-012-9350-4>
- Zheng, H., Li, D., & Hou, W. (2011). Task design, motivation, and participation in crowdsourcing contests. *International Journal of Electronic Commerce*, 15(4), 57–88. <https://doi.org/10.2753/JEC1086-4415150402>
- Zhong, L., Ai, X., & Chen, X. (2018, July). New product development strategy based on crowdsourcing. In *2018 15th International Conference on Service Systems and Service Management (ICSSSM)* (pp. 1–5). IEEE. <https://doi.org/10.1109/ICSSSM.2018.8465113>