

## **EXPLORING CROWDSOURCING FRONTIERS: A POWERFUL APPROACH TO PROBLEM-SOLVING AND INNOVATION**

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### **ABSTRACT**

*This study conducts a comprehensive literature review to investigate the impactful utilization of crowdsourcing in problem-solving and innovation, particularly within Small and Medium-sized Enterprises (SMEs). The exploration underscores the capacity of crowdsourcing to leverage collective intelligence, nurture novel product concepts, and facilitate open innovation. Employing a systematic methodology for researching existing literature, the study adheres to a systematic approach to amalgamate knowledge, delineate research trends, and pinpoint future avenues in crowdsourcing, explicitly focusing on content analysis and systematic methodologies. She was acknowledged as a potent instrument for innovation and problem-solving; crowdsourcing bears substantial implications for diverse domains, especially within SMEs. Despite the recognized advantages, unexplored facets and potential challenges persist, necessitating thorough research to comprehend the mechanisms for seamlessly integrating crowdsourcing into SME operations. Future studies should give precedence to exploring the roles of leadership, organizational learning, and the impact of crowdsourcing on SME performance to propel advancements in understanding within this context.*

**Keywords:** Collective Intelligence, Crowdsourcing, Innovation, Small and Medium-sized Enterprises (SMEs)

## ABSTRAK

Penelitian ini melakukan tinjauan literatur menyeluruh untuk menyelidiki pemanfaatan *crowdsourcing* yang berdampak pada pemecahan masalah dan inovasi, terutama dalam lingkup Usaha Kecil dan Menengah (UKM). Eksplorasi ini menggarisbawahi kapasitas *crowdsourcing* untuk memanfaatkan kecerdasan kolektif, merangsang konsep produk baru, dan memfasilitasi inovasi terbuka. Dengan menerapkan metodologi sistematis untuk mengkaji literatur yang ada, penelitian ini mengadopsi pendekatan terstruktur untuk mengintegrasikan pengetahuan, menganalisis tren penelitian, dan menandai arah masa depan *crowdsourcing*, dengan fokus utama pada analisis konten dan metodologi sistematis. Diakui sebagai alat yang kuat dalam inovasi dan pemecahan masalah, *crowdsourcing* memiliki dampak yang signifikan di berbagai domain, terutama dalam konteks UKM. Meskipun keunggulan ini diakui, masih ada aspek-aspek yang belum dieksplorasi dan tantangan potensial, yang memerlukan penelitian yang cermat untuk memahami mekanisme khusus dalam mengintegrasikan *crowdsourcing* ke dalam operasi UKM dengan lancar. Studi mendatang sebaiknya memberi prioritas untuk mengeksplorasi peran kepemimpinan, pembelajaran organisasi, dan dampak *crowdsourcing* pada kinerja UKM untuk mendorong kemajuan pemahaman dalam konteks ini.

**Kata Kunci:** *Crowdsourcing*, Inovasi, Kecerdasan Kolektif, Usaha Kecil dan Menengah (UKM)

### A. INTRODUCTION

Crowdsourcing has emerged as a potent approach for addressing problem-solving and fostering innovation, particularly within Small and Medium-sized Enterprises (SMEs). This entails mobilizing the collective intelligence, skills, and resources of a diverse cohort or the public to tackle challenges and propel innovation within organizations (Nickerson et al., 2016). The literature underscores *crowdsourcing*'s capacity to facilitate the generation of innovative product ideas, bolster open innovation initiatives, and offer solutions to challenges pertinent to the focal firm. Additionally, it accentuates the pivotal role of *crowdsourcing* platforms in tackling innovation issues for businesses and catalyzing open innovation endeavors (Vignieri, 2020).

The efficacy of *crowdsourcing* in knowledge-based industries, with a specific focus on product innovation and problem-solving, has undergone scrutiny, concentrating on the moderating impact of transformational leadership and organizational learning (Devece et al., 2019). Furthermore, the role of *crowdsourcing* in the 4<sup>th</sup> Industrial Revolution (4IR) has been scrutinized, underscoring its escalating use in seeking solutions, fostering innovation, and steering product development (Obieke et al., 2023). The literature also delves into the potential of *crowdsourcing* in generating and capturing value and its influence on business models, particularly how organizations can create and capture value through business models grounded in *crowdsourcing* (Köhler, 2015).

Moreover, academic literature emphasizes the critical importance of strategic positioning within networks and the ability to absorb knowledge effectively, which

is pivotal in shaping the behavioral aspects of contributors to crowdsourced innovation. This underscores the necessity to understand the moderating factors influencing external network users' participation in crowdsourced innovation (Meng et al., 2021). The examination of governance considerations regarding the interactions between seekers and solvers in crowdsourcing for innovation contests has been meticulously conducted through a knowledge-centric perspective. This careful analysis elucidates the intricate dynamics of transferring knowledge between the seeker and the solver within the specific context of crowdsourcing (Piazza et al., 2019).

The potential of crowdsourcing in optimizing crowdwork, particularly in managing ill-defined tasks and groundbreaking innovation, has been explored, emphasizing the necessity for a post-Taylorism crowdsourcing model that empowers workers to actively engage and guide the workflow design process (Lykourantzou et al., 2021). Furthermore, the role of crowdsourcing in the various phases of product development processes and the patterns of crowd participation have been examined, shedding light on the concept of crowdsourcing as community-based innovation (Tran et al., 2012).

(Pavlidou et al., 2020) conducted a meticulous, systematic review of the crowdsourcing literature, delivering a critical analysis from diverse perspectives. This reference is pertinent as it underscores the burgeoning growth of crowdsourcing literature and its systematic analysis, a crucial aspect for comprehending the landscape of crowdsourcing within the SME context. (Veilleux, 2021) presents a systematic literature review focusing on open innovation in SMEs, offering a panoramic view of open innovation in SMEs. This reference is valuable for providing insights into the characteristics and determinants of open innovation, which are germane to understanding the potential impact of crowdsourcing on the innovation processes of SMEs.

Similarly, (Cricelli et al., 2021) conducted a systematic literature review on crowdsourcing and open innovation, furnishing an integrated framework and a research agenda. This reference is significant as it provides a comprehensive analysis of crowdsourcing and open innovation, integral components for exploring crowdsourcing frontiers within the SME context. (Zhong & Wang, 2022) emphasize the cost reduction and knowledge spillover benefits of crowdsourcing, crucial aspects to consider when probing crowdsourcing frontiers for SMEs. This reference offers valuable insights into the potential advantages of crowdsourcing within the SME context. (Mansor et al., 2022) strategically discuss the potential of crowdsourcing as an opportunity for SMEs to access external expertise and foster organizational innovation. This reference is pertinent as it elucidates the practical implications of transitioning from outsourcing to crowdsourcing, aligning with the overarching theme of exploring crowdsourcing frontiers for SMEs.

While previous research provides valuable insights, a gap exists in understanding contributor engagement, workflow design, and task optimization for SMEs. Therefore, this study aims to conduct a systematic literature review to glean insights into the role of crowdsourcing as a potent approach for problem-solving and innovation within Small and Medium-sized Enterprises (SMEs). Through this nuanced exploration, the study seeks to contribute to a more profound

understanding of crowdsourcing frontiers for SMEs, providing valuable insights for both academia and practitioners in marketing and innovation management.

## **B. LITERATURE REVIEW**

### ***Conceptualization of crowdsourcing***

Crowdsourcing, originating in the mid-2000s, involves outsourcing internal functions to a large, undefined group via open calls (Blair et al., 2019). Its adaptability makes precise definitions challenging (Estellés & González, 2012). The requester, workers, and intermediation platform (Zhao & Zhu, 2016). (Morschheuser et al., 2017) connect crowdsourcing and gamification, proposing integrating game elements to enhance engagement. (Karachiwalla & Pinkow, 2021) explore crowdsourcing contests for innovation, showcasing diverse applications.

Addressing grand challenges, (Gippel et al., 2019) provide a conceptual framework emphasizing broader societal implications. (Vignieri, 2020) explores crowdsourcing as open innovation, linking it to multi-sided platform success drivers. (Zogaj et al., 2015) evaluate governance mechanisms for project success.

Conceptually linked to the gig economy, crowdsourcing involves soliciting work from a crowd via an online open call (Lehdonvirta, 2018). Three key elements encompass the crowd, initiator, and process (Szopik-Depczyńska et al., 2021). Frameworks and models aid in understanding IT-enabled crowdsourcing (Modaresnezhad et al., 2020), while system dynamics modeling explores the success drivers of crowdsourcing platforms (Vignieri, 2020).

Scholarly efforts consolidate academic definitions, reflecting ongoing attempts to establish a complete definition (Hervé & Schwienbacher, 2018; Hossain, 2016). Key design elements in crowdsourcing initiatives, especially innovation contests, are emphasized (Karachiwalla & Pinkow, 2021). Beyond business, crowdsourcing is explored in public policy and is viewed as a technology for public participation and idea generation in politics (Morozova, 2015). In conclusion, the scholarly discourse on crowdsourcing offers diverse definitions, conceptualizations, and applications with implications for SMEs.

### ***The evolution of crowdsourcing***

Crowdsourcing, refined in its definition, fosters connectivity and collaboration in information systems (Chen et al., 2020). It proved valuable during the pandemic, facilitating financial funding, collaboration, and data integration for open innovation (Rumanti et al., 2022). In SMEs, open innovation practices, including crowdsourcing, enable collaboration and knowledge creation, addressing challenges in independently managing the entire innovation process (Cricelli et al., 2021; Grimaldi et al., 2013).

Innovative owner-managers play a crucial role in crowdsourcing practices for SMEs (Mansor et al., 2022). Fueled by crowdsourcing, open innovation allows collaborative product development and offers SMEs access to novel ideas, market feedback, and resource-efficient task execution (Boldbaatar & Choi, 2022; Devece et al., 2019). Crowdsourcing enhances SMEs' innovation capabilities, granting access to diverse innovation resources and shifting to agile innovation strategies (Li

et al., 2018; Mansor et al., 2022).

Crowdsourcing empowers SMEs to tap external knowledge, solve problems, and drive innovation (Randhawa et al., 2019). However, challenges include careful management and understanding of its implications, with barriers including a lack of executive experience and effective task management (Djelassi & Decoopman, 2013; Qin et al., 2016). Despite challenges, crowdsourcing offers SMEs opportunities for sustainable growth and enhanced competitiveness by leveraging external knowledge and engaging with consumers.

### **C. RESEARCH METHOD**

Our systematic literature review (SLR) on crowdsourcing employs a structured methodology encompassing planning, execution, and reporting. This rigorous approach, rooted in content analysis, aims to comprehensively map the knowledge landscape, drawing on organizational and behavioral theories (Martinez et al., 2019). Addressing potential gaps, our review advocates for quantitative content analysis to identify emerging themes in crowdsourcing research (Cricelli et al., 2021; Pavlidou et al., 2020).

Key objectives include analyzing design elements in crowdsourcing initiatives, exploring diverse perspectives, and assessing applications across domains (Karachiwalla & Pinkow, 2021; Lenart, 2022). This SLR methodology ensures the reliability and validity of our synthesized findings, providing valuable insights for current and future research in crowdsourcing.

### **D. RESULTS AND DISCUSSION**

The synthesized findings provide a comprehensive exploration of crowdsourcing dynamics within the SME landscape, emphasizing key facets:

Understanding collective intelligence and resource mobilization is crucial in the crowdsourcing landscape for SMEs. Platforms for crowdsourcing in business innovation drive SMEs towards heightened creativity, idea generation, and open innovation initiatives. Crowdsourcing effectively generates innovative ideas and solves complex problems within SMEs, illustrating its instrumental impact on addressing innovation challenges. Crowdsourcing in knowledge-based industries reveals diverse applications, business models, and influence on innovation and knowledge transfer.

Crowdsourcing is acknowledged as a significant paradigm shift in innovation in the 4<sup>th</sup> Industrial Revolution context. Crowdsourcing-based business models have varied applications and strategic implications across diverse business domains, contributing to a nuanced understanding of its multifaceted roles. Leveraging crowd capabilities to address challenges requires careful task design, information dissemination, and allocation. Crowdsourcing in various product development phases enriches the approach to handling intricate tasks, providing a strategic avenue for aggregating diverse human input.

Crowdsourcing catalyzes community-based innovation, fostering collaboration, inclusive task design, and mitigating barriers to practical problem-solving. The academic contributions of crowdsourcing discourse provide valuable insights and directions for ongoing and future research endeavors.

Open innovation in SMEs, focusing on crowdsourcing, is explored as a transformative approach to overcoming resource constraints and fostering organizational innovation. The assessment of crowdsourcing cost-benefit and knowledge spillover highlights its potential to yield valuable returns while accessing external expertise and promoting innovation within SMEs.

### ***The landscape of crowdsourcing in SMEs***

The exploration of crowdsourcing within small and medium-sized enterprises (SMEs), specifically in the context of collective intelligence and resources, requires a comprehensive understanding of associated barriers, strategies, and best practices for mobilizing collective intelligence (Nguyen et al., 2019). As highlighted by (Nguyen et al., 2019), existing literature points to a significant gap regarding guidance on overcoming barriers to mobilizing collective intelligence, emphasizing the need for insights into addressing these challenges. This highlights the complexities researchers face across diverse disciplines when harnessing collective intelligence.

The essential role of diverse skills and crowd input in this landscape is underscored by (Kudyba et al., 020). By emphasizing a collective intelligence approach, the study explores identifying factors propelling effective decision-making and shaping the future of work. The analysis of team dichotomies, including skills, backgrounds, and gender factors, emerges as a crucial aspect influencing perceptions and interpretations of information resources. This underscores the importance of understanding and leveraging diverse skills within the crowd to facilitate effective decision-making in SMEs.

In the broader context of crowdsourcing, the study conducted by (Etlioğlu,2021) on crowdsourcing and participant behavior in social media marketing is particularly pertinent. The study highlights the use of social media tools to harness the target audience's collective intelligence and innovative ideas, shedding light on the potential of integrating crowdsourcing in SMEs to tap into the crowd's collective intelligence for innovative solutions and insights.

In summary, the landscape of crowdsourcing in SMEs, with a focus on collective intelligence and resources, requires an in-depth understanding of barriers, strategies, and best practices for mobilizing collective intelligence. This involves keenly recognizing the pivotal role of diverse skills and crowd input in facilitating effective decision-making.

### ***Platforms for crowdsourcing in business innovation***

Crowdsourcing platforms play a crucial role in open innovation for SMEs, offering access to external knowledge and resources (Vignieri, 2020). The literature highlights crowdsourcing's significance in driving business sustainability, particularly in SMEs, focusing on its role in knowledge-intensive industries and its relationship with transformational leadership and organizational learning (Devece et al., 2019; He et al., 2022).

Crowdsourcing enables SMEs to overcome resource constraints, fostering innovation by generating novel ideas (Li et al., 2018). It strengthens marketing efforts, increasing consumer engagement, co-creation opportunities, and cost

optimization, facilitating new ideas and advancing open innovation (Sesale & Seeletse, 2017).

Contrary to diminishing R&D investment, crowdsourcing strategies complement SMEs' open innovation initiatives (Li et al., 2019). Integrating crowdsourcing in design and manufacturing enhances operations, design performance, and innovation in SMEs (Qin et al., 2016; Li et al., 2020).

In open innovation ecosystems, crowdsourcing platforms are vital for collaboration, frugal development, and fostering inter-organizational relationships to support SMEs (Radziwon & Bogers, 2017; Genuchten et al., 2019). Managerial perspectives emphasize the impact of community users' creativity on the success of crowdsourcing initiatives, driving innovation and enhancing SME performance (Zahay et al., 2018; Xu et al., 2015).

The literature suggests that redesigning business models to multi-sided structures can create value for SMEs by reducing search and networking costs and supporting crowdsourcing and open innovation initiatives (Parmentier & Gandia, 2017). The systematic literature review provides comprehensive evidence of SMEs' crowdsourcing landscape, particularly in business innovation, idea generation, and open innovation initiatives.

### ***Crowdsourcing generates ideas and solves problems.***

Crowdsourcing is recognized as a valuable tool for Small and Medium Enterprises (SMEs) in product idea generation and problem-solving (Zahay et al., 2018). Managerial perspectives position crowdsourcing as a mechanism for developing innovative products, emphasizing its synergy within team-based idea generation (Girotra et al., 2010). Involving ordinary users in the ideation phase through crowdsourcing directly accesses the crowd's knowledge, aligning with the trend of firms leveraging crowdsourcing for ideas and problem-solving in the dynamic economy (Schemmann et al., 2016).

Crowdsourcing is a problem-solving model for continuous product development and commercialization in SMEs (Tran et al., 2012). In marketing, online crowdsourcing systems gather ideas for new products and services from a large, dispersed crowd (Nishikawa et al., 2017). The role of crowdsourcing in searching for solutions, innovation, and product development is emphasized, particularly in the context of the 4<sup>th</sup> Industrial Revolution (Obieke et al., 2023). For SMEs, crowdsourcing helps integrate external innovations, compensating for innovation capacity deficits and enhancing design flexibilities (Li et al., 2020).

Insights into motivations for adopting crowdsourcing, such as risk reduction and core competencies, have been provided, focusing on optimizing and coordinating crowdsourcing supply chains (Li et al., 2018). (Martinez et al., 2019) present an organizational framework for analyzing crowdsourcing initiatives crucial for understanding organizational models related to SMEs engaging in crowdsourcing. (Gama et al., 2018) stress the importance of idea generation and open innovation in SMEs, especially in market-based collaboration. Boldbaatar and (Choi, 2022) discuss the design of crowdsourcing supply chains in short life cycle products, emphasizing the iterative process that is valuable for SMEs.

The literature underscores crowdsourcing's potential to contribute effectively

to SMEs' new product development, address innovation challenges, and provide diverse solutions.

### ***Crowdsourcing in knowledge-based industries***

Crowdsourcing is a prominent phenomenon in knowledge-based industries, leveraging collective intelligence through online platforms for specific goals (Pavlidou et al., 2020). Comprehensive reviews explore its applications, business models, and impact on innovation and knowledge transfer (Majava & Hyvärinen, 2022; Cricelli et al., 2021; Devece et al., 2019). In knowledge-based industries, crowdsourcing facilitates innovation and knowledge transfer, particularly in healthcare ecosystems, focusing on inter-organizational knowledge transfer (Bisit, 2021). Studies highlight its role in SMEs for decision-making and adopting new work methods, propelling innovation and knowledge acquisition (Guo et al., 2017).

Crowdsourcing's role in open innovation is explored, enhancing open innovation performance and fostering trilateral trust in business relationships (Obieke et al., 2023). It extends beyond individual organizations to inter-organizational governance and collaborative innovation efforts. Diverse applications include addressing engineering design problems and business process crowdsourcing (Thuan et al., 2017; Qin et al., 2016).

Challenges associated with the adoption of crowdsourcing are investigated, such as barriers and opportunities for new product development in manufacturing SMEs (Zogaj et al., 2015). Studies examine governance mechanisms and participation patterns in crowdsourcing projects to understand dynamics in product development processes (Tran et al., 2012). The systematic literature review reveals a rich body of research covering applications, business models, impact on innovation and knowledge transfer, and challenges and opportunities in crowdsourcing adoption.

### ***Crowdsourcing in the 4<sup>th</sup> Industrial Revolution***

Crowdsourcing is a notable innovation paradigm within the dynamic landscape of the 4<sup>th</sup> Industrial Revolution (4IR), characterized by technology convergence across physical, digital, and biological domains (Kodama, 2018). Despite limited exploration in the 4IR context, crowdsourcing is recognized as an emerging trend with potential applicability in various domains (Obieke et al., 2023; Mao et al., 2017).

Crowdsourcing applications in the 4IR are diverse, including its use in agricultural contexts and the conceptualization of "Crowd-IoT" for potential architectures and security aspects within the Internet of Things (Minet et al., 2017; Ang et al., 2022). A systematic review emphasizes the role of micro-tasking activities in crowdsourced software development, highlighting crowdsourcing's significance in software engineering processes (Zulfiqar et al., 2022).

The literature stresses the importance of a comprehensive understanding of crowdsourcing, including its challenges and opportunities. Privacy provision in crowdsourcing is highlighted, indicating that ethical and privacy considerations are pivotal in implementing crowdsourcing initiatives (Hosseini et al., 2015).

In conclusion, while recognized as a significant paradigm shift in innovation,



the specific applications and implications of crowdsourcing within the 4<sup>th</sup> Industrial Revolution are ongoing subjects of exploration and investigation.

### ***Crowdsourcing-based business models***

Crowdsourcing-based business models are lauded for their ability to address dynamic user needs, cope with short product life cycles, and navigate competitive climates effectively (Köhler, 2015). These models adhere to robust business criteria, offering compelling value propositions, achieving favorable cost structures, and facilitating value capture (Köhler & Nickel, 2017). Successful instances, especially in renowned venture companies, have spurred transformations across industries (Boldbaatar & Choi, 2022).

Aligning crowdsourcing-based business models with strategic management and media technologies is crucial for responding to evolving market demands (Djelassi & Decoopman, 2013). However, success depends on predefined metrics to assess alignment with business strategy (Blair et al., 2019). Automating crowdsourcing into business models correlates with organizational learning and value creation, enhancing governance processes (Gansiniec & Sułkowski, 2020).

Crowdsourcing innovation involves transferring traditional innovation tasks to external network users, showcasing its potential as an innovation driver (Meng et al., 2021). Optimization and coordination of crowdsourcing supply chains highlight its diverse applications across business domains (Li et al., 2018), serving as an effective strategy for problem-solving and profit generation (Zhong & Wang, 2022).

Challenges, including low-quality contributions and insufficient engagement, underscore the need for effective management and design in crowd-based business models. Research delves into optimal fee structures and charging strategies, emphasizing the importance of mechanism design (Wen & Lin, 2015; Chen et al., 2019). Nuanced consideration of crowdsourcing unlocks its potential for attracting and engaging crowds in various business models (Täuscher, 2017).

The evolution of business models open to innovation communities, like crowdsourcing platforms, has been scrutinized, highlighting their dynamic nature and adaptation over time (Chanal & Fasan, 2010). Identifying critical success factors in crowdsourced systems emphasizes the strategic nature of crowdsourcing in attracting motivated individuals capable of delivering superior solutions (Naeini & Atashkar, 2016).

In conclusion, the synthesis emphasizes the diverse applications and strategic implications of crowdsourcing in various business domains.

### ***Leveraging crowd capabilities***

Navigating ill-defined task challenges in crowdsourcing requires careful task design, information dissemination, and allocation (Allahbakhsh et al., 2013). (Royo & Yetano, 2015) advocate confining crowdsourcing to well-structured problems for clarity and structure. Scholarly discourse emphasizes breaking complex tasks into manageable sub-tasks for individual contributions (Estellés & González, 2012; Petrović et al., 2020). Collaboration effectively addresses ill-defined tasks, emphasizes inclusive task design, and mitigates barriers (Majchrzak et al., 2021;

Singh et al., 2022). Clear task descriptions and initial information are crucial for success (Royo & Yetano, 2015). (Martinez et al.'s (2019) taxonomy provide a framework for implementing ill-defined crowdsourcing initiatives via four pillars: crowdsourcer, crowd, crowdsourced task, and crowdsourcing platform. The literature highlights crowdsourcing's potential to tap into external, non-redundant, and problem-specific knowledge, serving as a strategic avenue for aggregating diverse human input and accessing specialized knowledge to enrich the approach to handling intricate tasks (Wahl et al., 2022).

### ***Crowdsourcing in product development phases***

Crowdsourcing in product development is extensively explored in academia (Zahay et al., 2018; Obieke et al., 2023; Jin et al., 2016; Chhajer & Satpathy, 2022). Acknowledged for its role in idea generation and innovation, crowdsourcing varies across organizational domains (Fuchs & Schreier, 2010). In Crowdsourcing-based New Product Development (NPD), two phases, ideation and product development, are identified (Zhu et al., 2017). Crowdsourced ideas are crucial in the fuzzy front end, ensuring continuous alignment with market demands (Köhler, 2015). Customer involvement through crowdsourcing impacts product development, explored in the literature on crowd participation patterns and suitable crowdsourcing models (Djelassi & Decoopman, 2013; Chang & Taylor, 2016; Tran et al., 2012; Zulfiqar et al., 2022; Jin et al., 2016). Crowdsourcing's link to open and collaborative innovation supports design thinking, benefiting new product development (Majava & Hyvärinen, 2022). Scholarly literature emphasizes crowdsourcing's potential to enhance product development, aligning with market needs and fostering innovation through diverse models.

### ***Crowdsourcing as community-based innovation***

Crowdsourcing, extensively examined in various domains, is crucial in community-based innovation. (Köhler, 2015) identifies challenges faced by CrowdSpirit, emphasizing the importance of understanding crowdsourcing-based business models for community-based innovation success. (Scupola and Nicolajsen, 2021) explore enterprise crowdsourcing and its impact on organizational culture, while (Meng et al., 2021) and (Meng & Sun, 2019) delve into crowdsourcing's role in enhancing knowledge structures and user interactions for innovation. (Mollick, 2016) discusses the prevalence of community-based innovation, highlighting its application in diverse fields (Tran et al., 2012) position crowdsourcing as a community-based innovation in product development. (Zogaj et al., 2014) address challenges and management in crowdsourced innovation, emphasizing effective strategies. (Wang et al., 2019) and (Snow et al., 2010) contribute insights into decision-making behavior, governance structures, and innovation contests in crowdsourcing. (Blohm et al., 2017) explore effective management of crowdsourcing platforms, while (Borromeo & Toyama, 2016) discuss unpaid crowdsourcing motivations. (Lenart & Sułkowski, 2020) caution about crowdsourcing limitations, emphasizing a balanced approach for community-based innovation. Effective governance and management are crucial for successful crowdsourcing in community-based innovation.

### ***Contributions to the crowdsourcing academic discourse***

Crowdsourcing, extensively explored in scholarly literature, has delved into definitions, models, applications, and future research directions (Ozcan et al., 2022). Notable contributions include insights into governance mechanisms, network positions, and diverse perspectives influencing crowdsourcing initiatives (Liu et al., 2022; Mazzola et al., 2023; Estellés & González, 2012). Internal crowdsourcing is a focal point with a structured review and an outlined research agenda (Zuchowski et al., 2016). Additionally, the literature offers a comprehensive review, particularly emphasizing crowdsourcing contests from the crowdsourcing firm's perspective (Karachiwalla & Pinkow, 2021).

Crowdsourcing literature examines perspectives on governance, network positions, and definitions (Liu et al., 2022; Mazzola et al., 2023; Estellés & González, 2012). It also explores disruptive processes in crowdsourcing competitions, revealing motivations and driving forces (Faullant & Dolfus, 2017). A systematic review highlights key contributions in governance, network positions, internal crowdsourcing, and design elements, contributing to a nuanced understanding of crowdsourcing.

### ***Open innovation in SMEs***

Open innovation in SMEs involves integrating innovative products, services, or business models to differentiate themselves (Rosenbusch et al., 2011). Due to limited marketing capabilities, SMEs turn to open innovation, seeking external knowledge to enhance innovation (Oduro, 2019). This trend positively correlates with growth in manufacturing and service industries, impacting SMEs' sustainability (Meng et al., 2021).

Factors influencing open innovation adoption in SMEs include efficiency, especially in Industry 4.0, and reliance on external knowledge-sourcing strategies (Anshari & Almunawar, 2021; Brunswicker & Vanhaverbeke, 2014). SMEs exhibit increased open innovation activities, including technology licensing and external networking, driven by their informal structure and specialization (Bianchi et al., 2010; Hitchen et al., 2017).

The implications of open innovation in SMEs extend to innovation performance and growth, positively influencing firm performance and yielding indirect benefits like enhanced reputation and connectivity (Brem et al., 2017; Wibisono, 2021). External collaborations are pivotal in augmenting SMEs' innovation capabilities (Grimaldi et al., 2013).

In conclusion, open innovation in SMEs, driven by external knowledge, collaboration, and innovative practices, enhances competitiveness and sustainability, contributing significantly to innovation performance and growth in dynamic business landscapes.

### ***Assessing crowdsourcing cost-benefit and knowledge spillover***

Cost-benefit analysis is crucial for evaluating crowdsourcing effectiveness in product innovation strategy. (Zhong & Wang, 2022) emphasize that crowdsourcing can significantly reduce development costs, accelerating organizational and

personal learning for enhanced product innovation quality. This highlights compelling cost-saving advantages that attract organizations to adopt crowdsourcing.

The literature on crowdsourcing platforms and business sustainability, exemplified by (He et al., 2022), indicates a growing acknowledgment among scholars and practitioners of the importance of understanding the costs and benefits of crowdsourcing initiatives.

In addition to cost considerations, knowledge spillover benefits in crowdsourcing are a pivotal area of interest. (Grillitsch & Nilsson, 2015) explore collaborations in offsetting local knowledge spillovers, emphasizing the potential for knowledge enhancement from crowdsourcing activities, contributing significantly to overall benefits.

(Lenart & Sułkowski's, 2020) work underscores the importance of organizational learning and value creation in local governance. It highlights the need for effective incentives and frameworks to maximize the value of crowdsourcing initiatives while mitigating associated threats. This emphasizes the multifaceted nature of knowledge spillover benefits and the strategic management imperative for organizations.

## **E. CONCLUSIONS**

Crowdsourcing has emerged as a significant phenomenon with far-reaching implications across various domains. The existing literature underscores the necessity for a more profound understanding of the factors influencing firm performance through crowdsourcing initiatives. Moreover, the potential utilization of crowdsourced information, particularly in aggregated intelligence, opens new research avenues for amalgamating crowdsourcing with market research and business intelligence processes (Simula & Vuori, 2012). Additionally, the role of crowdsourcing in organizational learning and value creation, specifically in local governance, accentuates the need for further exploration of knowledge creation, democratic aspects, and economic value in crowdsourced policymaking (Lenart & Sułkowski, 2020).

Crowdsourcing is acknowledged as a valuable tool for e-participation, providing citizens with the means to influence political agendas and contribute to problem-solving (Royo & Yetano, 2015). Furthermore, the adoption of crowdsourcing in manufacturing SMEs presents opportunities for new product development, although the key challenges and opportunities in this context remain underexplored (Qin et al., 2016). The potential for crowdsourcing to enhance the capabilities of small and medium-sized enterprises (SMEs) by fostering connectivity and collaboration is also emphasized (Li et al., 2018; Du & Li, 2019). Additionally, the deliberate and strategic nature of planned access to the crowd and the ongoing technological advances needed to conduct crowdsourcing initiatives are emphasized (Blair et al., 2019).

The effectiveness of crowdsourcing in knowledge-based industries and the moderating role of leadership and organizational learning are crucial areas for further investigation (Devece et al., 2019). Furthermore, the shift from outsourcing to crowdsourcing practices in SMEs and the design of crowdsourcing supply chains

in short life cycle products present new avenues for research (Mansor et al., 2022; Boldbaatar & Choi, 2022). Crowdsourcing initiatives are perceived to capitalize on the creativity and diverse perspectives of online enthusiasts, providing richer solutions than those generated solely by firms (Li et al., 2019).

Future research should examine crowdsourcing models in specific contexts and their integration with existing crowdsourcing platforms (Thuan et al., 2017). Additionally, the support from crowdsourcing is recognized as a means for SMEs to integrate external innovations, compensate for self-innovation capacity deficits, and enhance design flexibilities (Li et al., 2020). Exploring the platform's role in selective crowdsourcing and various task types requires further investigation (Deng & He, 2018). Finally, the fortification of marketing through crowdsourcing and social responsibility is recognized as a growing trend with implications for consumer engagement, co-creation, task optimization, and cost reduction (Sesale & Seeletse, 2017).

In summary, crowdsourcing allows SMEs to harness external knowledge, creativity, and resources to overcome challenges and foster innovation. However, numerous unexplored dimensions and potential barriers necessitate rigorous research and empirical studies. Future research should concentrate on elucidating the specific mechanisms through which crowdsourcing can be effectively integrated into SMEs' operations and innovation strategies. Moreover, exploring the role of leadership, organizational learning, and the impact of crowdsourcing on SME performance will be pivotal for advancing our understanding of crowdsourcing in the context of SMEs.

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