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Business Process Management (BPM) Maturity in Small and Medium Enterprises (SMEs): Systematic Literature Review

Azizah Hadny Qurrota Ayun[1*] dan Budhi Prihartono[2]
[1,2] Master of Industrial Engineering and Management, Faculty of Industrial Technology, Institut Teknologi Bandung, Jl. Ganesa No.10, Lb. Siliwangi, Kecamatan Coblong, Kota Bandung, 40132, Indonesia
Email: azizayun98@gmail.com[1], budhi.prihartono@itb.ac.id [2]

Abstract

Business process is an essential aspect of a company and must be managed continuously using Business Process Management (BPM). To support BPM implementation, many researchers have developed maturity models that can measure the existing implementation and provide improvement roadmaps to a company. However, most of the maturity model research have not taken SMEs' context into consideration in developing the maturity model even though they have distinct characteristics than large companies. The maturity model that is specifically designed or applied in SME context is scarce and underdeveloped despite the importance of SMEs to developing countries such as Indonesia. This research aims to explore the development of BPM maturity research in SMEs and analyze its research focus and purpose of use, using a systematic literature review method. Based on the result, the research on BPM maturity in SMEs is limited, with only 14 articles since 2005. The number of articles has decreased in the last five years. Most of those articles focused on applying the maturity model in a real-life context and mostly served a descriptive purpose only, thus unable to provide improvement roadmaps for companies. Therefore, further studies should explore this research topic by developing a maturity model of BPM specifically designed for SMEs with a prescriptive purpose of use.

Keywords: business process, business process management (BPM) capability, maturity model, small medium enterprises (SMEs), systematic literature review

[1*] Azizah Hadny Qurrota Ayun
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1. Introduction

A business process is a collection of activities that transforms input into output to generate value for customers (Davenport, 1992; Hammer & Champy, 2001; Zairi, 1997). Its tight linkage with customer value makes it one of the most valuable aspects of a company that contributes to business performance (Paschek et al., 2016). Therefore, to maintain business profitability, a company should continuously manage and improve its business process through business process management (BPM).

BPM is a comprehensive system to manage the end-to-end business process which includes modeling, implementation, monitoring, and improvement of a business process (Hammer, 2015; Mendling et al., 2018). The BPM concept which is focused on the stability, efficiency, and effectiveness of a business process has been implemented in various companies to enhance their customer value, thus increasing their competitiveness (Hammer, 2015; Kubíčková & Procházková, 2014; Trkman, 2010). It can also assist companies in improving their business process that cannot meet customer needs (Hammer, 2015). BPM can also affect employees' performance positively such as increasing their work motivation and improving employees' productivity (Souz et al., 2020; Talapatra et al., 2019).

Many research already developed BPM maturity models to support BPM implementation. The maturity model is a conceptual model that describes the organizational capabilities development through several stages. It can be utilized to measure the existing capabilities of a company and suggest areas of improvement (de Bruin et al., 2005; Iversen et al., 1999; Kazanjian & Drazin, 1989; Solli-Sæther & Gottschalk, 2010). Around 150 business process or BPM maturity models were developed in many research (de Bruin & Rosemann, 2007). However, most of the maturity models were only considering the characteristics of large companies, whereas the research in SME context is underdeveloped. In Europe, only around 20% - 45% of BPM research used SME as its research object (Bandara & Opsahl, 2017; Feldbacher et al., 2011; Pejić Bach et al., 2019).

The implementation of BPM is beneficial for improving SMEs' performance, such as enhancing efficiency, increasing profitability, improving customer relationship, shortening processing time, saving operational cost, and improving their market competitiveness (Chong, 2006). Furthermore, improving SMEs' performance is worthwhile for a developing country such as Indonesia due to SMEs' uttermost contribution to the economy. In Indonesia, SMEs contribute to 60,5% of the national Gross Domestic Product (GDP) and absorb 96,9% of human forces in 2022 (Coordinating Ministry for Economic Affairs, 2022). SMEs developed rapidly each year, reaching 66 million companies in 2023 (Kadin Indonesia, 2023).

Besides the limitation of BPM maturity research in SME context, BPM maturity research mostly only discuss the development or implementation of maturity models. The empirical research that supports the validity and essentiality of the model is scarce (Tarhan et al., 2016). In addition, most BPM maturity models are descriptive models that cannot guide maturity improvement in a company (Röglinger et al., 2012).

This research aims to provide more detailed information regarding BPM maturity research in SME, including its research focus and purpose of use. This research was conducted through a systematic literature review (SLR), which is a method to evaluate and interpret all research that is relevant to a certain research hypothesis, discussion area, or interesting phenomenon (Kitchenham, 2007). An SLR is used to determine current research gaps and suggest further study (Von Wangenheim et al., 2010).

Some scholars already performed SLR on BPM topic such as Tarhan et al. (2016) who investigated empirical studies of BPM maturity models, Röglinger et al. (2012) who evaluated 10 BPM maturity models against the general design principle of maturity model from Pöppelbuß & Röglinger (2011), van Looy et al. (2017) who reviewed 69 maturity models in BPM domain to generate several important criteria for users, and Pejić Bach et al. (2019) who conducted literature study about the implementation of Business Intelligence (BI) and BPM in SMEs. None of the scholars besides Pejić Bach et al. (2019) has reviewed BPM maturity research in the context of SMEs. Even though Pejić Bach et al. (2019) already included SMEs in their research, their research discussed a broad term of BPM not only BPM maturity model. They only indicated some literature that discuss BPM maturity in SMEs without exploring the maturity articles in a more detailed manner,. Therefore, this study is the first research that specifically analysed the literature on BPM maturity in SMEs which can describe the development of BPM maturity research in SMEs, indicate the research gaps, and find a new way for future research.

2. Research Methods

A systematic literature review is a method to answer a specific question or to test a hypothesis (Greenhalgh & Peacock, 2005). In the past few years, SLR has become the source of further study that is verifiable and trusted due to its ability to identify current research gaps (Kitchenham et al., 2009; Webster & Watson, 2002). Some features that should be fulfilled by SLR research are including all relevant research, using a transparent analysis method, and applying particular criteria to generate values from the previous research (Rousseau et al., 2008). Tranfield et al. (2003) suggested using a process that is replicable, scientific,

and transparent in conducting SLR to increase the confidence of the reader about current research situation related to the research question. Various research used different methodologies in SLR. Tranfield et al. (2003) used ten stages, while Briner & Denyer (2012) only performed five stages. This research followed five stages of SLR that is used in several studies (Correia et al., 2017; Röglinger et al., 2012; Tranfield et al., 2003; Webster & Watson, 2002). The stages are as follows:

1) Problem formulation and research question identification
2) Literature search
3) Literature evaluation
4) Analysis and interpretation
5) Presentation

A detailed explanation of the first four stages above will be presented in section 2.1, 2.2, 2.3, and 2.4 while the last stage is in section 3 (Result and discussion).

2.1 Problem Formulation and Research Question Identification

Formulating the problem and identifying the research question is the first step in SLR. The BPM maturity model has become one of the companies' assets in expanding business process performance (Dijkman et al., 2016; McCormack & Johnson, 2001). The importance of BPM in an organization has increased rapidly nowadays due to globalization, conformance requirement, information and technology opportunities, and many more (van Looy et al., 2017). Not only for large corporations, BPM also ought to be implemented in SMEs. Rosemann & Vom Brocke (2015) explained that BPM has a direct relationship with SMEs. If an SME is reluctant to apply BPM, the likelihood of its bankruptcy will be elevated (Owusu, 2020). In spite of its importance, the research on BPM in SMEs is underdeveloped (Bandara & Opsahl, 2017; Feldbacher et al., 2011; Pejić Bach et al., 2019), especially the research on BPM maturity. Therefore, the first research question can be formulated as follows:

> RQ1. How is the development of BPM maturity research in the SME context?

Most of BPM maturity research are focused on development purposes. Only some articles validated or applied the maturity models developed in a company (Tarhan et al., 2016). In addition, the application of generic maturity models in SMEs is complicated due to their typical natures, especially their 'smallness' characteristic which can hinder them reaching maturity in the generic maturity models. Feldbacher et al. (2011) attempted to apply a generic BPM maturity model (PEMM) in SMEs and all SMEs that they surveyed were unable to meet the lowest level of PEMM maturity model. Moreover, the majority of BPM maturity models only serve a descriptive purpose of use, thus cannot guide maturity improvement in SMEs (Pöppelbuß & Röglinger, 2011; Tarhan et al., 2016). From this explanation, three research questions can be identified as follows:

> RQ2. What is the main research focus of BPM maturity research in SMEs?
> RQ3. Is there any adaptation required before applying the generic BPM maturity model to SMEs?
> RQ4. What is the application-specific purpose of use of the BPM maturity model used in SMEs?

2.2 Literature Search

The second step in SLR is literature search. A literature search was conducted by determining the database and source of information used, keywords, and searching strategy. Tranfield et al. (2003) recommended utilizing various sources of information such as unpublished research, conference proceedings, journals, and the Internet in SLR. This research used SCOPUS as the database source. Conference proceedings and journals are the sources of information used in this research. Keywords for the literature search were created by exploring the synonym of "Business Process Management", "Maturity Model" and "BPM Maturity". The keywords string used in the SCOPUS database are as follows.

> *TITLE-ABS-KEY ("process maturity" OR "business process maturity" OR "process management maturity" OR "business process management maturity" OR "BPM maturity" OR "business process orientation maturity" OR "process management capability" OR "BPM capability" OR "business process capability") OR ("business process orientation" AND ("maturity model" OR "capability model")) OR ("business process management" AND ("maturity model" OR "capability model")) OR ("business process" AND ("maturity model" OR "capability model")) OR ("business process management" AND "measurement instrument") OR ("business process orientation" AND "measurement instrument"))*
> *AND*
> *TITLE-ABS-KEY ("SME*" OR (small AND medium AND ("enterprise" OR "firm" OR "business" OR "family firm"))*

The literature search strategy is by exploring all journals or conference proceeding articles that contain the keywords presented above in the Title, Abstract, or Article's keyword. This research includes all articles from all publication years to investigate the trend of BPM maturity research from year over year.

2.3 Literature Evaluation

The third stage in SLR is evaluating the articles generated from the literature search. To evaluate the literature obtained from the SCOPUS, this research used several inclusion and exclusion criteria according to the purpose of this research. The inclusion and exclusion criteria are as follows.

Inclusion criteria:
- Using English language
- Discussing maturity or capability assessment in such domains: process, business process, process management, business process management, or business process orientation
- Discussing domain inclusively

Exclusion criteria:
- Article that is related to the domain but in a narrow subject (i.e. software development and improvement process, supply chain management, knowledge management, agile development process, product development process, etc)
- Discussing maturity or capability assessment outside the domain specified (i.e. industry 4.0, logistics 4.0, safety system, etc)
- Article that only discussing business process management or business process orientation capability in SME context without including its capability measurement
- Article that mentioned the keyword used as a research implication or research impacts

An initial search in the SCOPUS with the keywords proposed resulted in 72 articles. After filtering the source of information, the articles reduced to 60 articles. After that, 46 articles that are unable to meet the inclusion criteria and fulfilled the exclusion criteria were eliminated from the literature review. Those articles are not using English language, discussing the domain in a specific subject (i.e. instrumental aspect of BPM, green BPM, software development and improvement, agile development process, supply chain management, requirement engineering, product development process, product design process, validation process, manufacturing process, and enterprise system), discussing maturity of other domain outside the topic (i.e. safety system, industry 4.0, intra-logistics 4.0, logistics 4.0, and virtual engineering), only discussing BPM capabilities or BPM success factors without including capability measurement, and only mentioned the keywords as a research implication (i.e. ERP research and process mining research). The final number of articles reviewed are 14 articles. Table 1 shows the evaluation stage performed in this research and the number of articles on each stage.

Table 1. Literature Evaluation Stage

Evaluation Stage	Number of Articles
Initial search	72
Only articles from journals and conference proceedings	60
Article selection based on the inclusion and exclusion criteria	14

2.4 Result Analysis and Interpretation

The next step of SLR is analysis and interpretation of the results of literature evaluation stage. This step aims to summarize the information acquired from the literature. This research used three categories to synthesize information from each article. Table 2 shows the categories used in analyzing the articles and the description of each category. The classification of the articles to each category will be explained more in the Section 3.

Table 2. Analysis Categories

Analysis Category	Subcategory	Description
Article identification	Author	Author of the article
	Country	Origin country of the author
	Publication year	Article publication year
	Publication type	Publication type (journal or conference proceeding)
Research focus	Development	Development of a new maturity model
	Application	Application of a maturity model or evaluation of the companies' maturity
	Validation	Validation of the existing model or model proposed, conceptually or empirically
	Meta-analysis	Combining several maturity research such as comparation, classification, and theoretical analysis
Maturity model purpose of use	Descriptive	Serves as-is maturity measurement only
	Prescriptive	Provides as-is maturity measurement and guidance to improve the maturity

3. Results

This section presents the results of literature analysis specifically to answer the research questions.

3.1 Article Identification and Development

Only 14 articles from 72 articles fulfilled the inclusion critera. Eight articles are from conference proceedings and six others are from journals. The articles are then classified based on the publication period and the authors' country of origin to understand the trend of publication in each period and the country that dominates BPM maturity research in SMEs. Figure 1 shows the growth of the literature in each period.

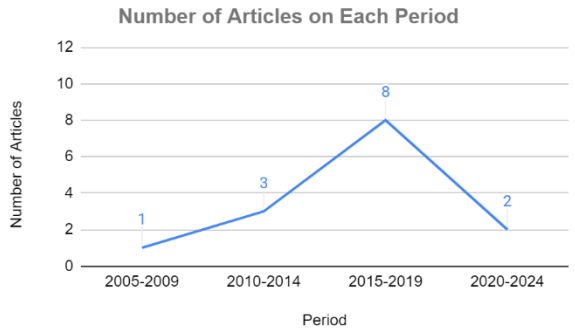

Figure 1. Number of Article Each Period

Based on the diagram above, the research on BPM maturity in SMEs were increasing from 2005 to 2019 and most articles were produced in the 2015 – 2019 period. The number plummeted in 2020 – 2024 period, with only two articles so far.

The nationalities of the authors is also examined to identify which country has contributed the most articles on BPM maturity in SME context. Figure 2 indicates the authors' origin country of the evaluated articles.

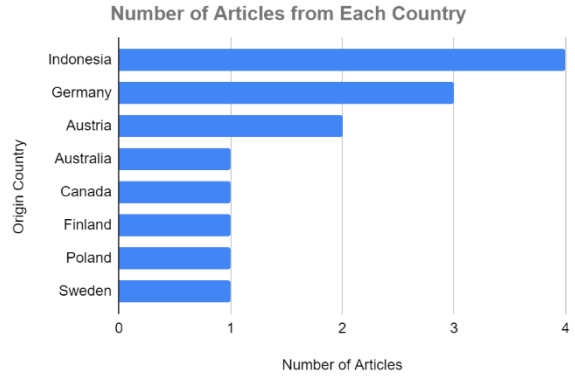

Figure 2. Number of The Articles from Each Country

The graph shows eight countries with BPM maturity research in SME context. Indonesian author published most of the research with four articles in total, followed by Germans author with three research. Austrians author only produced two articles, while the author from other countries such as Australia, Canada, Finland, Poland, and Sweden composed only one article each. Indonesian author domination in this topic could be affected by the direct contribution of SMEs to Indonesia's economy and the abundant number of SMEs in Indonesia.

The result of article identification and development proves that the research on BPM maturity in SMEs is underdeveloped. In the last 20 years, only 14 articles discussed BPM maturity in SMEs. Moreover, from 2020 until today, the number of articles related to the topic was dropping. Nevertheless, the dynamic business environment, raised by technological and market disruption after COVID-19, intensifies the urge to implement BPM in SMEs to maintain their profitability and support their business continuity. Therefore, we suggest a further study of BPM maturity model in SMEs, especially the one that encompasses current business conditions.

3.2 Research Focus and Generic Model Adaptation

The articles are categorized into four groups according to their research focus. A more detailed description of each research focus is as follows (Tarhan et al., 2016; Wendler, 2012):

- Development: article that develops or designs a new maturity model. It could be a conceptual model, design model, or description of a model if the intention is to introduce a new model
- Application: article that applies the maturity model in several contexts or domains, including maturity assessment and transfer method of the maturity model
- Validation: article that validates the existing maturity model conceptually or empirically, compares the maturity model, or validates the maturity model to the business performance
- Meta-analysis: article that combines various research results, including literature review, process model in developing maturity model, model selection guidance, and other theoretical considerations in maturity model

One article can contain more than one research focus. For example, a maturity model development article can also validate the model thus it can be grouped into the development and validation research focus. Table 3 shows the article reviewed in each research focus.

Tabel 3. Research Focus of The Article

Research Focus	Number of Articles	Author (Year)
Development	4	Heinze & Geers (2009); Isoherranen et al. (2016); Jochem et al. (2011); Mamoghli et al. (2018)
Application	6	Andriani et al. (2018); Bandara & Opsahl (2017); Dewi & Mahendrawathi (2019); Feldbacher et al. (2011); Okręglicka et al. (2015); Utami et al. (2020)
Validation	4	Isoherranen et al. (2016); Mamoghli et al. (2018); Sehlin et al. (2019); Singer (2015)
Meta-analysis	2	Britsch et al. (2012); Chotijah (2023)

Most articles are focused in applying the maturity model, with seven articles in this research focus. Four articles focused on the development and validation of maturity models, while only two articles discussed meta-analysis research focus.

The application research focus articles utilized various generic maturity models to measure BPM or business process implementation in SMEs. For example, BPOMM (McCormack & Johnson, 2001) and Škrinjar & Trkman model (2013) were used in the research of Dewi & Mahendrawathi (2019) and Utami et al. (2020); BPMM-OMG maturity model (Object Management

Group (OMG), 2008) was utilized in the article of Andriani et al. (2018) and Okręglicka et al. (2015); BPMMM-QUT maturity model (Rosemann & De Bruin, 2005) was applied in the literature of Bandara & Opsahl (2017); and PEMM maturity model (Hammer, 2007) was used by Feldbacher et al. (2011).

Even though using a generic maturity model, four articles performed some adjustment to implement the model in SMEs. Dewi & Mahendrawathi (2019) modified the IT implementation dimension of Škrinjar & Trkman model (2013) into IT readiness measurement due to the limitation of IT application in Indonesia SMEs. Okręglicka et al. (2015) modified the BPMM-OMG maturity level (Object Management Group (OMG), 2008) to conform the specific characteristics of SMEs. Bandara & Opsahl (2017) also adapted the BPMMM-QUT maturity level (Rosemann & De Bruin, 2005) into only four levels because it is almost impossible for SMEs to reach the highest level of the maturity model due to their resource constraint. In addition, Feldbacher et al. (2011) performed a considerable adaptation to the PEMM maturity model (Hammer, 2007) in the dimension, criteria, and maturity level. The implementation of this model in SMEs is arduous, even SMEs cannot reach the lowest maturity level of the model. The PEMM model is more suitable for large companies with operating process management systems. Therefore, even though the generic maturity model was developed to occupy all conditions or contexts of the company, some adaptations are required before implementing the model in SMEs due to the 'smallness' of SMEs. It would be really hard for SMEs to reach maturity if the criteria were only considering large companies' natures. Further research is needed to develop a maturity model that is specifically designed for SMEs to ease the assessment of BPM maturity in SME context.

Four articles are categorized in the development research focus. Those articles developed maturity models with different purposes and components. Mamoghli et al. (2018) developed a maturity model in SMEs with two measurement components, such as IT supporting system of the business process and the compatibility between the human factor and the technology used. The model was validated using two case studies in Canadian fashion SMEs. Isoherranen et al. (2016) designed a maturity model to evaluate the quality and operational excellence of business processes easily, considering the resource and time limitations of SMEs. The research also validated the model using case studies in 20 North Finland manufacturing SMEs. The other two articles discuss the development of a business process maturity model, which integrates knowledge management concept and business process maturity, considering the characteristics of SMEs (Heinze & Geers, 2009; Jochem et al., 2011). These two articles are connected whereas the first article is the conceptualization and the second one is the realization of the concept developed before.

Overall, each article covers different aspects of BPM maturity model, such as human factor and IT, quality and operational excellence, and knowledge management in business processes. Besides, all research mentioned before only developed maturity models to measure business process implementation, not the overall capability of BPM in SMEs.

The validation research focus consists of four articles, two of them validating the development of maturity model (Isoherranen et al., 2016; Mamoghli et al., 2018) while two others validating BPM maturity in SMEs with other variables such as innovation level, digital transformation level (Sehlin et al., 2019) and also the economy success of a company (Singer, 2015). Sehlin et al. (2019) adopted Cronemyr & Danielsson's (2013) maturity model in assessing process maturity, while Singer (2015) adapted the PEMM model (Hammer, 2007) with modifications in maturity level and criteria assessed. This result concludes that validation articles in the maturity model are limited and should be developed more in the future to support the applicability of the maturity model in SMEs. Besides, no literature has empirically validated BPM maturity contribution to SMEs' performance. Singer (2015) only investigated the impact of BPM maturity on SMEs' success qualitatively. Therefore, further research should empirically examine the effect of BPM maturity on SMEs' performance, specifically their profitability.

The least discussed research focus is meta-analysis. There are only two articles that explored this research focus. The first article compared the result of BPM maturity in Indonesia's SMEs (Chotijah, 2023), while the other one evaluated the applicability of business processes or BPM maturity models in SMEs (Britsch et al., 2012). The score achieved in Britsch et al. (2012) research can guide SMEs in choosing the suitable maturity model for them. However, that research only evaluated three maturity models and excluded the widely used models such as BPMMM-QUT or BPOMM.

3.3 Maturity Model Purpose of Use

All articles in each research focus except meta-analysis can be evaluated based on the application-specific purpose of use. Pöppelbuß & Röglinger (2011) deduced a framework of general design principles for each maturity model's purpose of use, such as descriptive and prescriptive purposes. The descriptive model only describes and measures the existing BPM maturity, while the prescriptive model provides an improvement guideline or roadmap. The design principles for each purpose of use are as follows.

- Basic Design
  DP 1.1 Basic information

DP 1.2 Definition of the main constructs related to maturity and maturation
DP 1.3 Definition of the main constructs related to the application domain
DP 1.4 Documentation according to the target group

- Design Principle for Descriptive Purpose
  DP 2.1 Verifiable criteria between subject on each maturity level and level of granularity
  DP 2.2 Assessment methodology according to the target group
- Design Principle for Prescriptive Purpose
  DP 3.1 Improvement measures on each maturity level
  DP 3.2 Decision calculus in selecting improvement measures
  DP 3.3 Decision methodology according to the target group

In this section, the maturity model used or developed in each article is classified according to its purposes of use. Table 3 indicates the grouping of each maturity model according to the purpose of use.

Tabel 3. Purpose of Use Classification

Purpose of Use	BPMM-OMG	BPOMM	BPMMM-QUT	PEMM	(Cronemyr & Danielsson, 2013)	Others		
						(Mamoghli et al., 2018)	(Isoherranen et al., 2016)	(Jochem et al., 2011)
Descriptive	V	V	V	V	V Basic descriptive	V Basic descriptive	V Basic descriptive	V Basic descriptive
Prescriptive	V Strong prescriptive	-	V Impicitly	V Medium prescriptive	V Medium prescriptive	V Implicitly	V Implicitly	V Implicitly

Only one maturity model, the BPMM-OMG model, contains a profound prescriptive purpose. Andriani et al. (2018) and Okręglicka et al. (2015) applied this model in SME context. This model explained the practice of each process area to guide the improvement and determine the improvement area in each business process. Other generic models, such as the BPMM-QUT model, Cronemyr & Danielsson's (2013) model, and the PEMM model, contain prominent descriptive purposes but quite deficient in prescriptive purposes. The BPMM-QUT model only provides each maturity level description as its improvement roadmap. In contrast, Cronemyr & Danielsson's (2013) model and the PEMM model already indicates the priority of improvement using the score of maturity level or the color indicator. The last generic model analyzed, the BPOMM model, only serves the descriptive purpose of use because it can only measure the existing maturity of a company without describing the guideline for improving the maturity.

The articles in 'other' category is the recently developed or new maturity model. All articles on this category (Isoherranen et al., 2016; Jochem et al., 2011; Mamoghli et al., 2018) comprise the basic descriptive and implicit prescriptive purpose of use. Moreover, those articles do not unveil the developed assessment instrument. Furthermore, the research of Jochem et al. (2011) excluded the description of the dimension used.

Overall, most maturity model used in the articles only provide implicit improvement roadmaps by using the description of each maturity level. Further study is required to build the BPM maturity model with a deeper prescriptive characteristic, indicating the improvement prority, to help SMEs upgrading their BPM maturity level.

4. Conclusion

This research aims to investigate the research on BPM maturity in SMEs, indicate the research gaps, and find the opportunity for further studies. Based on the literature search and evaluation, the research on BPM maturity in SMEs is limited and underdeveloped. From 2005 – 2024, there are only 14 articles discussing this topic and this number was decreasing in the last five years.

The majority of the articles are focused on maturity model application in SMEs. However, some research required to adapt the generic maturity model used with SMEs' characteristics before utilizing it. None of the maturity models was designed specifically to comprehend SMEs' nature. Some models that were designed in SMEs context only measure business process capability or some specific components of business process, thus unable to measure the overall BPM capability of SME.

Most of the articles reviewed only used or developed a maturity model with implicit prescriptive purpose of use by using the maturity level description as improvement roadmaps. The research with explicit prescriptive purpose of use is scarce even though it can guide the improvement strategy in SMEs more clearly.

Based on the analysis, there are some opportunities for further studies. The first is developing a BPM maturity model that specifically considered SMEs' unique characteristics. The model developed should

contain an improvement guideline for SMEs to deliver an explicit prescriptive purpose of use and it should be validated in SMEs to ensure its applicability. In addition, further study can also empirically investigate the impact of BPM maturity on SMEs' profitability.

This study contributes to meta-analysis research on the BPM maturity model in SMEs. It also guides further research to support BPM implementation in SMEs. This research still contains some limitations, such as the possibility of not encompassing all BPM maturity articles that used other keywords and not considering the maturity model architecture in the literature review.

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AUTHORS METADATA

I. **First Author*:**

1. First Name : Azizah
2. Middle Name : Hadny Qurrota
3. Last Name : Ayun
4. E-mail : azizayun98@gmail.com
5. Orcid ID : 0000-0001-5408-4826
6. Orcid URL : https://orcid.org/0000-0001-5408-4826
7. Affiliation : Institut Teknologi Bandung
8. Country : Indonesia
9. Bio Statement : Master of Industrial Engineering and Management, Faculty of Industrial Technology
10. Phone Number :

II. **Penulis Kedua:**

1. First Name : Budhi
2. Middle Name : -
3. Last Name : Prihartono
4. E-mail : budhi.prihartono@itb.ac.id
5. Orcid ID : 0000-0002-7686-3051
6. Orcid URL : https://orcid.org/0000-0002-7686-3051
7. Affiliation : Institut Teknologi Bandung
8. Country : Indonesia
9. Bio Statement : Master of Industrial Engineering and Management, Faculty of Industrial Technology
10. Phone Number :