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Services and the internationalization of manufacturing firms in Indonesia

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Abstract

Services have become the engine of the global economy. However, the role of services in the internationalization strategy of emerging market firms remains under-researched. In a case study of Indonesia, we focus on the role played by manufacturing firms' increasing use, production, and sale of services (or "servicification") in their productivity and exports. We provide a theoretical and empirical framework to study the relationship between servicification, productivity, and exports at firm level. In terms of theory, we rely on the Resource-Based View of internationalization in a heterogeneous firms setting. Regarding methodology, we use panel techniques with administrative firm-level data from the automobile industry. We show that servicification increases the probability of emerging market manufacturing firms exporting, both directly and indirectly through increases in productivity. Results from our case study provide evidence for emerging market firms that, on the one hand, productivity mediates the relationship between servicification and internationalization, and on the other hand, servicification moderates the relationship between productivity and internationalization. Our findings imply that creating unique resources through servicification allows firms to gain a competitive advantage that increases their productivity and helps them to internationalize.

Keywords: emerging market firms; exports; Indonesian automobile industry; internationalization; productivity; services; servicification.

JEL Classification: D22, F14, F23

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1. Introduction

In recent years, we have witnessed an unprecedented increase in the internationalization of emerging market firms (EMFs) (Gaur and Kumar 2010). The internationalization of EMFs differs from that of firms in advanced economies, in terms of motives such as the search for assets, resources, or efficiency (Cuervo-Cazurra et al. 2015). Luo and Tung (2007) explain that multinational enterprises (MNEs) in emerging markets consider international expansion as a springboard to gaining strategic resources, reducing home-country institutional and market constraints, and overcoming latecomer disadvantages. More recently, Luo and Tung (2018) have presented the changes in the global economy and argue that newer insights should be developed as emerging market MNEs experienced more complexity, heterogeneity, and vulnerability after the initial introduction of the springboard perspective. Traditionally, EMFs internationalize by competing on price or cost leadership (Brouthers et al., 2005), but Yiu et al. (2007) contend that EMFs could achieve superior performance in a host market by focusing on their advantage in low-cost inputs, strong network affiliation, ethnic connection, unique resources, technologies, and management approaches. EMFs can develop unique, valuable,

and difficult-to-imitate resources that help them to develop strong firm-specific advantages (Boermans and Roelfsema 2012); the resulting superior organizational performance and competitive advantage enable EMFs to internationalize (Schellenberg et al. 2018).

Services have become the engine of the global economy. They help to strengthen the integration of the global economy, e.g., by facilitating global value chains (Thangavelu et al. 2018). They also contribute to improved development potential in emerging markets (McKee 2008). Manufacturing firms are integrating services with their core customer solutions to combat the traditional competitive pressures on costs reduction, quality improvement and unique features inclusion, and to respond to new challenges (Bikfalvi et al. 2013). We analyze the role of the increasing use, production, and sale of services by manufacturers (hereinafter referred to as “servicification”) in EMFs’ internationalization. Servicification is a strategy that allows manufacturing firms to focus on core competencies and heterogeneous customer solutions, and be more productive and export oriented (Lodefalk 2017). Therefore, we test whether EMFs can exploit servicification to generate a competitive advantage through unique resources; specifically, if this strategy facilitates EMFs’ internationalization, we should observe a positive relationship between servicification and exports of manufacturing EMFs.

Firms with unique resources, in areas such as innovation, technology, management process, and manufacturing services, are more productive (Morris 2018; Thangavelu et al. 2018); and higher productivity levels explain why firms trade internationally (Bernard et al. 2007; Bernard et al. 2018). Therefore, firms’ productivity mediates their internationalization strategy. Accordingly, we include productivity in the analysis of the determinants of EMFs’ internationalization; specifically, we study the mediating effect of productivity on the relationship between servicification and internationalization. Additionally, the scope and extent of the services offered by manufacturers are positively related to business performance (He et al. 2015). Since servicification allows firms to offer heterogeneous solutions to their customers in both domestic and foreign markets, firms’ servicification is expected to have a positive association with both productivity and internationalization, especially for exporting activities (Barney 1991; Boermans and Roelfsema 2012; Lodefalk 2014; Lodefalk 2017). Therefore, we study the direct relationship between servicification and both productivity and internationalization. Finally, we study the moderating effect of servicification in the analysis of the relationship between productivity and internationalization.

To analyze the role of servicification in the internationalization of EMFs, this study seeks to answer three research questions, of which the first is relevant for a better understanding of the determinants of EMFs' internationalization, and the other two are relevant for a better understanding of the servicification-productivity-internationalization relationship:

1. To what extent does servicification affect EMFs' productivity and internationalization?
2. Does productivity mediate the relationship between servicification and internationalization?
3. Does servicification moderate the relationship between productivity and internationalization?

This study makes four main contributions to the literature. First, we make a theoretical contribution by relying on the Resource-Based View (RBV) of internationalization in a heterogeneous firm setting. We show that EMFs that build a unique, valuable, and difficult to imitate resource through servicification are more productive. These firms create a competitive advantage that helps them to internationalize. Second, we provide both a theoretical and empirical framework to analyze the mediating role of firms' productivity in the relationship between their servicification and internationalization, and the moderating role of firms' servicification in the relationship between firms' productivity and internationalization. These two effects have not been previously explored. Third, this study makes a methodological contribution by addressing endogeneity concerns (Lodefalk 2014; see, e.g., Eden et al. 2020; Lindner et al. 2021) in the analysis of the servicification-productivity-internationalization relationship. To do so, we use panel techniques with firm-level data. Finally, this study sheds light on the effect of servicification on EMFs' internationalization. Previous studies on servicification at firm level have focused on developed countries. By using a case study of Indonesia, our study shows that servicification increases productivity and internationalization in EMFs.

The rest of the paper is organized as follows. Section 2 presents the research background and builds the theory. Data and methods are described in Section 3. Section 4 presents the results and discussion. Finally, Section 5 concludes.

2. Background and Theory

2.1. Background

This research relies on theories of internationalization and servicification drawn from four interrelated branches of the literature: internationalization theory, EMFs' internationalization in relation to the RBV, heterogeneous firms theory, and servicification studies.

The first branch of the literature that has a bearing on this research consists of seminar contributions on internationalization theories, particularly in relation to MNEs. Theories of foreign direct investment (FDI) of MNEs (market imperfections, international production, and internalization) overcome the limitations of traditional international trade theories (absolute advantage, comparative advantage, factor proportion, and product life cycle) by considering the perspective of the firm. They hold that firms internationalize to capitalize on opportunities such as market imperfections, mobility of factors of production, and lower transaction costs (Morgan and Katsikeas 1997). However, these FDI theories failed to conceptualize the internationalization behavior of firms, i.e., entry mode choice, factors, paths, phases, and behavior of internationalization, which were later addressed in other internationalization theories of MNEs (Schellenberg et al. 2018). Traditional FDI and MNE theories are particularly appropriate for explaining what happens in large firms in developed countries. A shortcoming is that they do not explain the early and rapid internationalization of small and medium-sized enterprises (SMEs) (Cavusgil and Knight 2015) and under-resourced firms that expand globally, primarily through exporting (Eren-Erdogmus et al. 2010).

The second branch approaches EMFs' internationalization in relation to the RBV, where exporting is the dominant mode in their early stage of EMFs' internationalization, avoiding the traditional internationalization route of the MNE (Eren-Erdogmus et al. 2010). Differences between EMFs and traditional MNEs from developed economies motivate our focus on EMFs' internationalization through exports. Boermans and Roelfsema (2012) argued that EMFs internationalize by building firm-specific advantages based on their unique resources: this interpretation fits well with the RBV, rather than other internationalization theories such as Institutional Theory, Transaction Cost Theory, and the Eclectic Paradigm.² The application of the RBV to internationalization emphasizes the bundle of unique, valuable, and difficult-to-imitate tangible and intangible resources that help firms achieve sustainable competitive advantage and superior organizational performance, and drives them toward internationalization (Sharma and Erramilli 2004; Ruzzier et al. 2006; Schellenberg et al. 2018).

² A representative sample of studies on firms' internationalization is presented in Table A1, including the theory or model applied in each case (see Appendix).

Barney (1991) noted two significant assumptions of the RBV: resources, skills, and capabilities must be heterogeneously distributed across firms and must remain stable over time. These features underpin firms' ability to create unique resources through servicification.

Third, the heterogeneous firms model considers firms' heterogeneity in resources. This model predicts that firms export when they successfully overcome an "export-productivity" cut-off point (Melitz 2003; Bernard et al. 2007; Bernard et al. 2018). Melitz (2003) provided theory to explain a positive association between a firm's participation in export activities and productivity, and argued that exporting firms grow more rapidly than non-exporting firms in performance, capacity, and employment. Bernard et al. (2007), using data on US manufacturing firms, showed that exporters are more productive than non-exporters, enabling them to internationalize through self-selection. Similarly, Bernard et al. (2018) anticipated that higher productivity forces firms into greater international participation and entry into export markets.

The last branch of literature related to this research analyzes the role of servicification in firms' internationalization. In manufacturing, services contribute to production, making a direct contribution to total output and final demand, and an indirect contribution via deliveries of intermediate inputs (Pilat and Wöfl 2005), which positively affects the productivity of firms (Lodefalk 2014; Thangavelu et al. 2018). Servicification also allows firms to bundle various manufacturing services with customer solutions, enabling superior organizational performance and higher productivity, which drives firms toward internationalization. This occurs because the increase in productivity allows firms to overcome the export-productivity cut-off point identified by the heterogeneous firms model. Previous studies, mainly focused on developed countries, have shown that servicification positively affects the productivity of firms, although this impact varies by country according to differences in productivity and service intensity (Lodefalk 2014; Thangavelu et al. 2018; Ariu et al. 2019).³

In line with Cernat (2016), who claims that the characteristics of individual firms are at the core of internationalization studies and are relevant to policy decisions, the analysis should be conducted at the firm level. However, data availability in emerging economies is limited and, therefore, EMFs have been under-explored. Indeed, studies on the internationalization

³ Previous related studies on servicification are summarized in Table A2 (see Appendix).

of EMFs have mainly relied on aggregate national-level data to capture the macro determinants of internationalization, failing to consider the firm-specific constructs that lie at the core of the RBV (Wang et al. 2012a). Additionally, to date, the study of the role of servicification in firms' internationalization has largely focused on developed countries, with relatively little attention paid to EMFs. We analyze the role of servicification in the internationalization of manufacturing EMFs using Indonesian firm-level data. By doing so, we contribute to filling these gaps in the existing literature.

2.2. Theoretical Model

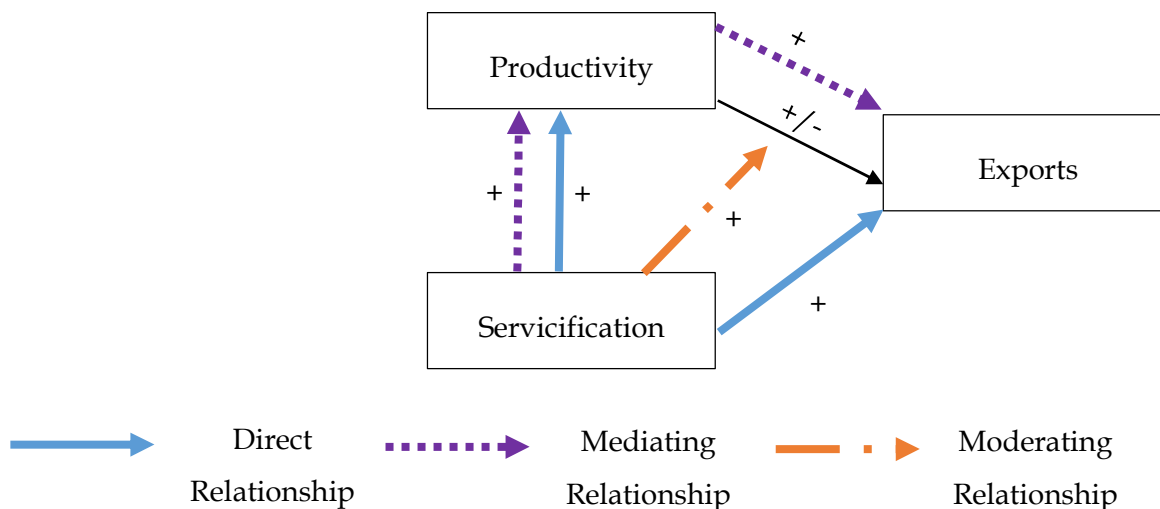
Manufacturing firms that provide services are relatively more productive and perform better than non-service-providers (Crozet & Milet, 2017; Lodefalk, 2014). As the former are expected to be more productive than the latter, and more productivity incentivizes firms to export (Bernard et al. 2007), then productivity mediates the relationship between servicification and internationalization. Manufacturing firms can also enter foreign markets and access foreign sales by utilizing services (Lodefalk 2017). As exporting is the dominant mode of internationalization for EMFs (Eren-Erdogmus et al. 2010), servicification incentivizes EMFs to export their unique customer solutions to other foreign markets. Thus, it is expected that servicification positively moderates the relationship between firms' productivity and exports.

To analyze the role of servicification in EMFs' internationalization, we rely on three main constructs: servicification, productivity, and internationalization (particularly exports). Servicification is a strategy that enables improvements to the resources of manufacturing EMFs, by developing a unique customer solution that increases their competitiveness in both local and foreign markets. Servicification may both increase exports and make EMFs more productive, allowing EMFs to overcome the export-productivity cut-off point. Therefore, servicification may provide a boost to EMFs' internationalization, both directly and indirectly, via productivity growth (mediating relationship). Our model also introduces an interaction between servicification and productivity (moderating relationship) that leads to an increase in exports.⁴ Figure 1 presents our model.⁵

⁴ It is worth noting that the heterogeneous firms model predicts that only more productive firms export, but evidence has demonstrated that the productivity of firms that export might not differ from that of firms that do not (Greenaway et al. 2005). For simplicity, we specify the relationship between productivity and exports as ambiguous.

⁵ In our model, "+" represents a positive association and "-" a negative association. The direction of the arrow denotes the direction of the effect. Note that the theoretical model in Figure 1 treats servicification as an exogenous variable, however, this model could be extended by incorporating other exogenous

Figure 1: Model for the relationship servicification-productivity-exports



Source: Own elaboration

3. Data and Method

3.1. Data

In our analysis of an emerging market economy, we focus on Indonesia. Strong domestic demand, robust macroeconomic reforms, and extensive participation in international trade have made Indonesia the 17th largest economy globally, with significant engagement with other economies at the bilateral, regional, and global levels (World Trade Organization 2013). Its strategic geographic location (World Bank 2021), remarkable diversity (Márquez-Ramos 2022), and the increasing contributions of the manufacturing sector to national growth (Rahardja et al. 2012) make Indonesia an ideal case study. These characteristics set Indonesia apart as a leading emerging economy, both geographically and strategically. However, Indonesia has not been considered in any of the firm-level studies surveyed in Tables A1 and A2 (Appendix).

To better understand the role of servicification in the internationalization of manufacturing EMFs, we focus on the Indonesian automobile industry, as we consider its global presence and impact on the national economy. This manufacturing industry has become a leading

variables to affect servicification and productivity (e.g., management resources). We believe that extending our model with additional exogenous variables is a promising avenue for future research. Nevertheless, in this research we tackle the potential endogeneity of servicification empirically by using panel techniques (fixed effects and first differences).

player in Indonesian economic growth (Nurchahyo and Wibowo 2015). In addition to manufacturing services as input, automobile firms bundle different services with their final goods, including maintenance, repair, replacement, and upgrades for an extended period. The Indonesian automobile industry is constrained by the low technological expertise of local producers, the small scale of production, the high profit margin of distributors, and the lower financial capabilities of customers (Aswicahyono 2000). The government's liberalization policy in the late 1990s did not improve the situation for local firms (Okamoto and Sjöholm 2000), and the industry has been mentioned as an example of how not to industrialize. In this regard, Aswicahyono (2000) pointed out that "the highly interventionist policy regime has resulted in an inefficient industry characterised by 'back-to-front' industrialisation, uneconomic production runs and minuscule exports" (page 209).

That said, Indonesia is the second-largest car manufacturer in the Association of Southeast Asian Nations, and is ranked the 5th and 15th largest producer of passenger vehicles in Asia and the world, respectively (Organisation Internationale des Constructeurs d'Automobiles [OICA] 2019). Although Indonesia's automobile industry has been more successful in terms of output growth in recent years than that of other countries in the region, such as the Philippines (Thoburn and Natsuda 2018), this industry is lagging behind in its export performance (Soejachmoen 2016). Focusing the analysis on this industry allows us to test whether servicification is a useful strategy for gaining the competitive advantage that allows firms to export. In our empirical analysis we test whether by providing services in addition to their manufacturing activities, manufacturing firms could gain a competitive advantage that allows them to export.

We recognize the importance of heterogeneity at the firm level not only theoretically, but also empirically (Eden et al. 2020), and use firm-level panel data in our empirical analysis. Specifically, we use data on manufacturing firms from the "Manufacturing Survey of Large and Medium-Sized Firms (Survei Industri Besar/Sedang, IBS)". Conducted by the Indonesian Statistical Agency (BPS), this is an annual census of manufacturing firms in Indonesia, which all firms with 20 or more employees must complete (see, e.g. Harrison and Scorse (2010)). The questionnaire, administered at the national level, is anonymous and covers a number of firm characteristics. Depending on the year, it covers industrial classification, ownership (public, private, foreign), exports, status of incorporation, assets, asset changes, use of electricity and fuels, income, output, expenses, capital stock, labor, raw material use, machinery and other

specialized questions (see, e.g., Márquez-Ramos 2022). This dataset has been widely used to analyze the determinants of firms' productivity and exports in Indonesia, (see, e.g., Sjöholm 1999; Okamoto and Sjöholm 2000; Blalock and Gertler 2004; Amiti and Konings 2007). More recent studies include those by Pane and Patunru (2020a; 2020b). One advantage of using this dataset is that it allows us to introduce the emerging markets' perspective. Another is that it allows us to leverage two specific valuable characteristics of the data: the panel information, to account for endogeneity; and reliable and valid information about firms' exports, productivity, and service provision. We focus the analysis on two years: 2014 and 2015.

3.2. Method

We rely on regression analysis because this method is widely used to analyze the determinants of export performance and productivity at firm level (Sousa et al. 2008; Chen et al. 2016; Pane and Patunru 2021). We use hierarchical modelling, which is relevant for our research, i.e., it involves at least two levels of analysis (Lindner et al. 2021). The relevant levels are country, industry, and firm. To obtain unbiased results, we should control for characteristics that correlate with servicification (independent variable of interest) and are relevant for the dependent variable. As we focus on a particular industry in a single country, we do not have to deal with endogeneity arising from country-level or industry-level omitted relevant factors. However, endogeneity concerns might arise if we were not able to capture all relevant firm-level variables. Therefore, we begin with a fixed effects panel model in which the independent variable of interest is servicification. We also include a time dummy for the most recent year to proxy for factors that vary over time, but are common to all firms. We estimate two baseline regression equations, one for productivity (see Equation 1) and one for internationalization, which in addition to servicification, considers productivity as an independent variable (see Equation 2):⁶

$$Productivity_{it} = \alpha_1 Servicification_{it} + \alpha_2 Year2015 + \theta_i + \varepsilon_{it}. \quad (1)$$

$$Exporter_{it} = \beta_1 Servicification_{it} + \beta_2 Productivity_{it} + \beta_3 Year2015 + \theta_i + \mu_{it}. \quad (2)$$

Equation (1) presents a model for productivity, while Equation (2) presents a model for internationalization. The dependent variable in the productivity model is "Productivity", built as the natural logarithm of labor productivity (total value of goods produced per

⁶ This empirical strategy is consistent with the related literature on EMFs (see, e.g., Márquez-Ramos et al., 2012).

worker). Sub-indexes “i” and “t” denote firm and year, respectively. The dependent variable in the internationalization model, “Exporter”, is a dummy variable that equals one when firm i exports in year t, and zero otherwise. “Servicification” is the natural logarithm of the income received from manufacturing services by firm i in year t. “Year2015” is a dummy variable equal to one for 2015, and equal to zero for observations in 2014; θ_i denotes firms’ fixed effects; and ε_{it} and μ_{it} are the error terms of the productivity model and of the internationalization model, respectively. Finally, α_1 , α_2 , β_1 , β_2 , and β_3 are parameters to be estimated. Of particular interest are α_1 and β_1 : α_1 helps us to test whether servicification increases the productivity of EMFs; while β_1 helps us to test whether servicification increases the internationalization of EMFs.

In order to estimate the mediation effect of productivity and the moderation effect of servicification, we consider two variants of the internationalization model as follows:

Internationalization model with mediation effect of productivity

$$\text{Exporter}_{it} = \rho_1 \text{Servicification}(\text{domestic})_{it} + \rho_2 \widehat{\text{Productivity}}_{it} + \beta_3 \text{Year2015} + \theta_i + \mu_{it}. \quad (3)$$

Internationalization model with moderation effect of servicification

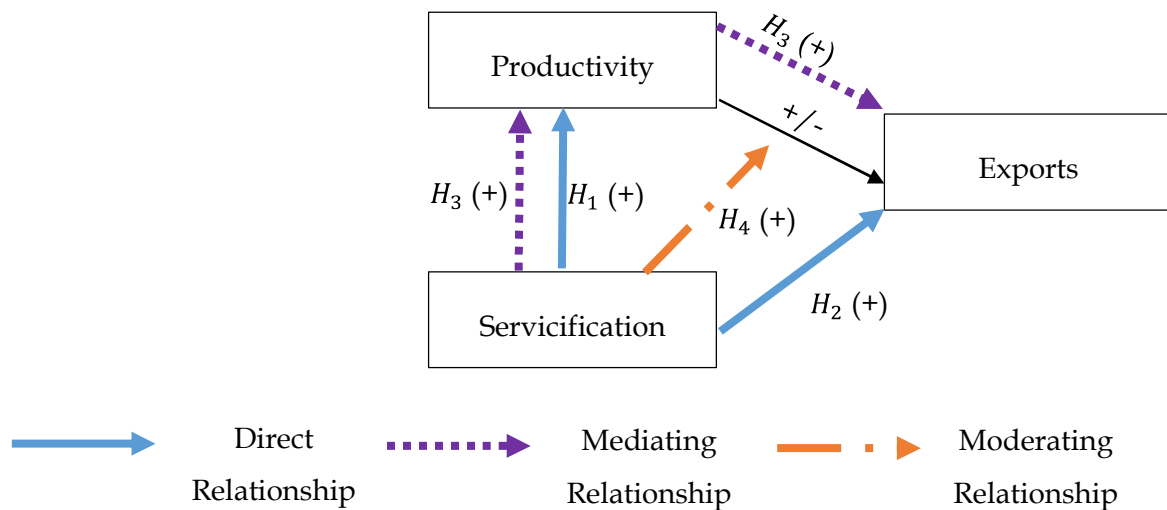
$$\text{Exporter}_{it} = \sigma_1 \text{Servicification}(\text{domestic})_{it} + \sigma_2 (\text{Productivity}_{it} \times \text{Servicification}_{it}) + \beta_3 \text{Year2015} + \theta_i + \mu_{it}. \quad (4)$$

Where “Servicification(domestic)” in Equations (3) and (4) is a dummy variable equal to one when firm i in year t received income from manufacturing services provided to domestic (Indonesian) firms (i.e., the firm provides domestic services). We include this variable as a control to test whether there is a differential effect of international *versus* domestic servicification on internationalization. ρ_2 is the parameter of interest to be estimated in Equation (3), which proxies for the mediation effect and helps us to test whether productivity positively mediates the servicification-export relationship. $\widehat{\text{Productivity}}_{it}$ is measured as the prediction of an Ordinary Least Squares (OLS) simple regression of the log of productivity (as dependent variable) on the log of servicification (as the independent variable); that is, the productivity model excluding firms’ fixed effects (θ_i) and “Year2015.” Finally, σ_2 is the parameter of interest to be estimated in Equation (4), which proxies for the moderation effect and helps us to test whether servicification positively moderates the productivity-export relationship. $(\text{Productivity}_{it} \times \text{Servicification}_{it})$ is the interaction between “Productivity”

(log of total value of goods produced per worker) and “Servicification” (log of the income received from manufacturing services) in the baseline internationalization model, i.e., Equation (2). Because the dependent variable is a categorical dummy variable in Equations (2) through (4),⁷ we run the internationalization model as set of regressions using a logit model in which we control for unobserved heterogeneity by transforming the regressors in first differences.⁸

For the sake of greater clarity, Figure 2 presents our model including the hypotheses to be tested in the empirical analysis. In the empirical analysis, we look at the sign and significance of the estimated coefficients for the corresponding parameters. Importantly, each parameter can be associated to a hypothesis, as summarized in Table 1.

Figure 2: Model for the relationship servicification-productivity-exports and hypotheses



Source: Own elaboration

Table 1: Summary of the hypotheses, corresponding equation, parameter, and expected signs

Hypothesis	Equation	Parameter	Sign
H_1 : Servicification increases the productivity of EMFs	1	α_1	+
H_2 : Servicification increases the internationalization of EMFs	2	β_1	+
H_3 : Productivity positively mediates the servicification-export relationship	3	ρ_2	+
H_4 : Servicification positively moderates the productivity-export relationship	4	σ_2	+

Source: Own elaboration

⁷ In this case, an anonymous reviewer suggested to use a logit model as our preferred specification.

⁸ In this set of regressions, domestic servicification and year dummies are omitted.

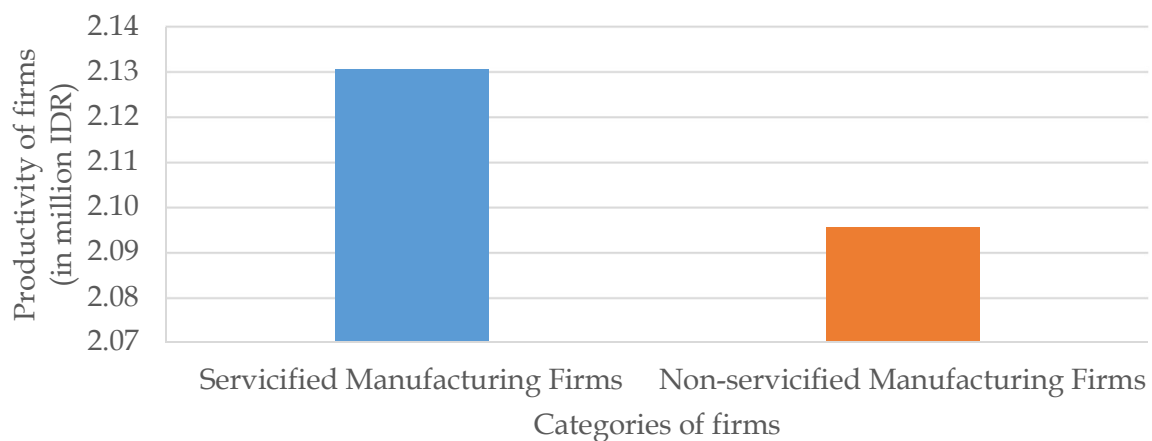
4. Results and Discussion

4.1. Descriptives and Correlation Analysis

We present correlations and descriptive statistics to validate whether the key theoretical tenets discussed above are found in the selected case study. Particularly, for the most recent year (i.e., 2015), we check whether servicified firms are more productive than non-servicified firms. In a performance comparison between exporting firms and non-exporting firms, we also check whether exporting firms are more productive than non-exporting firms, and pay attention to additional measures, including firms' size and proportion of foreign ownership.

First, we confirm that automobile manufacturing firms that undergo servicification are more productive than those that do not (see Figure 3). Second, when comparing selected indicators for exporting and non-exporting manufacturing firms, we find that exporting firms perform better than non-exporting firms in all the variables under study. On average, exporting firms are more productive than non-exporting firms, and exporting firms have more foreign ownership and employees than non-exporting firms.⁹

Figure 3: Productivity of servicified versus non-servicified firms



Source: Own elaboration with BPS data for 2015.

Table 2 presents the correlation analysis between the key variables to be used in the regression analysis. It shows that productivity and servicification are positively correlated, as expected.

⁹ Due to confidentiality issues, we do not provide the full descriptive statistics, but more details can be made available on request to the authors.

Servicification is also positively correlated with exports. Finally, for the sample analyzed, the correlation between productivity and exports is negative.

Table 2: Correlation analysis

	Servicification	Productivity	Exports
Servicification	1		
Productivity	0.3754	1	
Exports	0.0628	-0.1121	1

Source: Own elaboration with BPS data for 2014 and 2015.

This descriptive analysis is consistent with the theoretical tenets drawn from the literature (Crozet and Milet 2017; Kelle 2013; Lodefalk 2014; Lodefalk 2017; Thangavelu et al. 2018), validating the suitability of the selected case study.

4.2. Regression Results

We are able to follow 140 servified firms during the years 2014 and 2015. Column (1) in Table 3 presents the results from estimating the baseline productivity model (Equation 1), and columns (2), (3) and (4) present results of our preferred specification for the internationalization model (logit model with independent variables in first differences).

According to our results, higher servicification increases the productivity of manufacturing EMFs (column 1, Table 3). A 10% increase in servicification increases the productivity of the firm by 4.6%, *ceteris paribus*. In addition, the results obtained indicate that an increase in servicification has a positive and significant effect on the probability of exporting (column 2, Table 3).

The mediation effect of productivity (i.e., servicification --> increases productivity --> increases exports) is found to be significant (see column 3, Table 3). When we examine the moderation effect of servicification, we find a significant and positive effect of the interaction between productivity and servicification (column 4, Table 3).

Table 3: Results of the regression analysis: the productivity model (fixed effects panel model) and the internationalization model (logit estimates)

	Baseline	Baseline	Mediation	Moderation
	(1) Productivity	(2) Exporter	(3) Exporter	(4) Exporter
Servicification	0.456*** (6.148)			
Servicification (in differences)		0.370* (1.664)		
Productivity (in differences)		-0.427** (-2.043)	-0.427** (-2.043)	-0.973** (-2.502)
Mediation effect (in differences)			1.604* (1.664)	
Moderation effect (in differences)				0.032* (1.780)
Year 2015	0.286*** (3.247)			
No. of Obs.	280	140	140	140
R-Squared (within)	0.330			
Pseudo R-Squared		0.038	0.038	0.041

Source: Own elaboration with BPS data for 2014 and 2015. Notes: Regression results for the productivity model (column 1) and for the internationalization model with the regressors transformed in first differences (columns 2, 3, and 4). Signs of estimated coefficients in columns 2, 3, and 4 can be compared to those in columns 2, 3, and 4 of Table A3 (Appendix). ***, **, and * indicate statistical significance at the 0.01, 0.05, and 0.1 levels. Robust Z-statistics and T-statistics are in parentheses.

Table 4: Summary of the results obtained in relation to the hypotheses

Hypothesis	Effect obtained
H_1 : Servicing increases the productivity of EMFs	+
H_2 : Servicing increases the internationalization of EMFs	+
H_3 : Productivity positively mediates the servicing-export relationship	+
H_4 : Servicing positively moderates the productivity-export relationship	+

Source: Own elaboration with BPS data for 2014 and 2015.

For the internationalization model, we also run regressions using fixed effects (i.e., of Equations 2, 3, and 4, respectively). These results are presented in Table A3 in the Appendix.

Column (3) of Table A3 shows that there is not a statistically different effect of domestic versus international servicification. This result is corroborated in column 4 of Table A3. Table A3 confirms that servicification increases the probability of exporting (column 2, Table A3), and confirms the relevance of both the mediation effect of productivity (column 3, Table A3) and the moderation effect of servicification (column 4, Table A3). Table 4 summarizes our results obtained in relation to the hypotheses.

4.3. Discussion

In our descriptive analysis, we find that servicified EMFs are more productive than non-servicified firms. This result is in line with previous research for developed countries (Kelle 2013; Lodefalk 2013; Crozet and Milet 2017; Lodefalk 2017). We also find that EMFs that export perform better than non-exporting firms in several dimensions such as labor productivity, firm size, and FDI. This is also consistent with previous research (Kelle 2013; Lodefalk 2013; Boddin and Henze 2014; Lodefalk 2014; Crozet and Milet 2017).

The productivity and internationalization models estimated in this study confirm a positive and direct relationship between servicification and productivity, as well as a positive and direct relationship between servicification and exports in EMFs. This direct effect of servicification on EMFs' productivity is in line with previous findings for developed countries (Crozet and Milet 2017; Lodefalk 2017). Similarly, the direct effect of servicification on EMFs' internationalization (particularly exporting) is in line with results for manufacturing firms in developed countries (Lodefalk 2014; Lodefalk 2017). Servicification increases the productivity of manufacturing firms and their probability of exporting in both developed countries and in emerging markets.

Additionally, this study reveals a significant positive mediation effect of productivity on the relationship between servicification and internationalization (exporting). Previous literature posits that firms with unique resources, i.e., manufacturing services, are more productive (Thangavelu et al. 2018), and higher productivity levels explain why firms trade internationally (Bernard et al. 2007; Bernard et al. 2018). We show that firms' productivity mediates the servicification-internationalization relationship and should be considered when analyzing the determinants of internationalization. Finally, servicification positively moderates the relationship between productivity and exports. Therefore, servicification is a useful strategy to enable EMFs to gain a competitive advantage and thus to export.

5. Conclusion

Previous studies on the role of servicification in EMF internationalization are scarce. The present study bridges this gap in the literature by relying on three main constructs: servicification, productivity, and internationalization. Our findings show that higher servicification increases manufacturing EMFs' productivity and internationalization. Moreover, our results on the servicification-productivity-export relationship show a positive and significant mediation effect of productivity (i.e., servicification --> increases productivity --> increases exports) and a significant and positive effect of the interaction (moderation) between productivity and servicification on internationalization. Therefore, servicification is a strategy for EMFs to gain a competitive advantage that allows them to export.

Managers of EMFs can build a unique, valuable, and difficult-to-imitate resource through servicification, resulting in superior organizational performance and competitive advantage. Such a competitive advantage will incentivize managers to internationalize through exporting and leveraging foreign market opportunities. Managers of EMFs can concentrate on increasing productivity through developing firm-specific advantages, e.g., by introducing services. Creating unique resources through servicification allows firms to gain a competitive advantage.

This study is not without limitations, but these open up avenues for future research. We have emphasized the importance of unique resources of the firm (the traditional RBV). In the Digital Age, it is not only the ownership of such unique resources that is important, but also access to them. Key differentiating factors in servicification include the type of services and how well the strategy is implemented by the firm (the degree of innovation). Due to data limitations, this analysis is left for future research. Also, we focused on a single industry in Indonesia and concentrated on two years. Further research may seek to corroborate these results in other industries and emerging markets, so an avenue for future research is to examine whether the insights found in this research can be generalized to EMFs beyond Indonesia.

Future studies might also extend the investigation of the mediating role of productivity in the relationship between servicification and internationalization and the moderating role of servicification in the relationship between productivity and internationalization in developed

countries. These issues have yet to be explored in advanced economies. Such studies can be aimed at validating the theoretical propositions found in previous literature: the internationalization process of large MNEs in developed countries significantly differs from that of EMFs. Finally, future studies might also explore the effects of perceptions, adoption, and evaluation of servicification on firms' performance in a domestic setting.

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Ethical Approval

This article does not contain any studies with human participants performed by any of the authors.

Author Contributions

All authors contributed to the study conception and design. Introduction, background, discussion, and conclusion sections were prepared by I. S., and theoretical model, method, and results sections were prepared by L. M-R. Both authors commented on the first draft, corrections, and finally read and approved the final manuscript.

Conflict of Interest

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. The authors declare that there is no conflict of interest.

Data availability

The datasets generated during and/or analyzed during the current study are not publicly available due to confidentiality of the BPS data. However, more details can be made available on request to the authors.

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Table A1: List of studies related to the internationalization of firms reviewed in this paper

#	Study	Country Focus	Scope	Theory/ Model Adopted	Major focus of the study
1	Brouthers (2002)	European Union	Multi-sector	Transaction Cost, Institutional Context, Cultural cost	Examined foreign market entry mode choice and firm performances – financial and non-financial – based on transaction cost, institutional context, and cultural context.
2	Erramilli et al. (2002)	USA	Hotel Industry	Resource-Based View	Developed a theoretical framework based on the "organizational capability" perspective to explain the choice between two non-equity modes, franchising and management-service contracts.
3	Brouthers & Nakos (2004)	Netherlands & Greece	Multi-sector	Transaction Cost Economics	Entry mode selection of SMEs and implications for performance.
4	Roberto (2004)	Italy	Multi-sector	Eclectic Paradigm	Examined the choice between different FDI in Italy based on location factors.
5	Herrmann & Datta (2005)	USA	Large Manufacturing Firms	Resource-Based View	Examined the relationships between top management team characteristics and firms' international diversification.
6	Meyer & Nguyen (2005)	Vietnam	Multi-sector	Institutional Theory	Assumed a theoretical framework to analyze how institutions in an emerging economy (Vietnam) influence entry strategy decisions and analyzed the determinants of two key aspects of entry strategy: location and entry mode.
7	Somlev & Hoshino (2005)	Japan	Manufacturing MNEs	Eclectic Paradigm	Examined the predictive power of location factors for the mode of establishment and ownership choice of MNEs, controlling for parent experience and capabilities.
8	Arregle et al. (2006)	Japan	Multi-sector	Institutional Theory, Transaction Cost	Examined the multi-level determinants of entry modes (FDI-level variables, parent firm-level variables, and the interactions of both) based on institutional and transaction cost variables.
9	Sanchez-Peinado et al. (2007)	Spain	Service firms	Transaction Cost Economics	Investigated the effect of the international strategy on entry mode choice based on both transaction costs and strategic variables.

10	Brouthers et al.(2008)	Netherlands & Greece	Multi-sector	Transaction Cost Economics	Developed and tested a model of international entry mode choice that draws from real option theory and transaction cost economics perspectives.
11	Demirbag et al. (2009)	Turkey	Foreign Affiliated MNEs	Transaction Cost Theory, Institutional Context	Empirically analyzed the determinants of equity-based entry mode strategies of MNEs in host country markets.
12	Cui & Jiang (2012)	China	Firms with OFDI	Institutional Theory	Examined the effect of state ownership on Chinese firms' FDI ownership decisions, as well as firms' heterogeneous responses to external institutional processes during foreign market entry, while considering the political affiliation of firms with the external institutions.
13	Sedoglavich (2012)	New Zealand	High tech SMEs	Resource-Based View	Empirically examined how a firm's leading-edge technology affects the way international business is conducted.
14	Wang, Hong, Kafouros, & Wright (2012b)	China	Manufacturing Firms	Resource-Based View, Institutional Context	Examined the mechanisms through which government impacts the internationalization of EMFs considering the idiosyncratic manner of firms' affiliation with government agencies.
15	Meyer et al. (2014)	China	Foreign subsidiaries of MNEs	Institutional Theory	Explored how host country institutional pressures vary between firms in different types of ownership and how these firms differ accordingly in their local adaptation strategies.
16	Pan et al. (2014)	China	Listed firms with OFDI	Transaction Cost Theory	Explored how the level of subsidiary ownership was less affected by the heterogeneity of foreign institutional environments for firms with a higher level of government ownership and firms with legislative connections.
17	Pinto et al. (2017)	Latin America	Large Multi-sector Firms	Transaction Cost Economics, Institutional perspective	Examined the role of government support in the ownership choices made by multilaterals in cross-border acquisitions, both directly and in moderating the relationship between institutional distance and knowledge access.
18	Kalasin et al. (2020)	Multiple Emerging Markets	Publicly Traded Firms	Agency theory, Resource-Based View	Examined how state ownership affects the international expansion of emerging-market firms.

19	Nuruzzaman et al. (2020)	Multiple Emerging Markets	Manufacturing Firms	Institution-Based View	Examined institutional support and institutional hazards as two drivers of the international expansion of emerging economy firms, which in turn leverage the support and/or escape the hazards as they internationalize.
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Note: this table is organized first in chronological order and then in alphabetical order.

Table A2: List of studies related to servicification reviewed in this paper

#	Study	Years covered	Contribution/Purpose	Major Findings
1	Pilat & Wölfl (2005)	1990-2002	Studies the interaction between services and manufacturing using four different types of data, including firm-level data.	The traditional distinction between manufacturing and services is blurring, with the interaction taking on many forms. Services significantly contribute to production, both directly to total output and final demand, and indirectly through deliveries of intermediate inputs. A growing share of workers in the manufacturing sector are in services-related occupations. Manufacturing firms in most countries are not very diversified.
2	Pilat et al. (2006)	1970-2003	Provides empirical evidence on the changing nature of manufacturing in OECD countries and explores possible causes, including increased productivity, slow growth in demand for manufacturing products, loss of markets to imports, statistical and classification issues, and so on.	The share of manufacturing in OECD economies is declining and it is argued that this is likely to continue. The distinction between manufacturing and services is increasingly blurred. Manufacturing is becoming more and more integrated at the global level.
3	Lay et al. (2010)	2006-2007	Uses a broad European survey to understand the factors influencing service infusion and the extent to which it has already profoundly affected manufacturing industries.	Service turnover was still low, and the adopted service strategies did not seem fully developed. The most significant determinant of service sales was the breadth of services offered. The position in the supply chain did not seem to affect service infusion.
4	Kelle (2013)	2005	Identifies the most critical motives and associated features of three selected purposes of service export for German manufacturing firms.	By combining firm and industry-level data, finds higher economic importance of product-related services, which are an important determinant of firms' international competitiveness
5	Lodefalk (2013)	1997-2006	Fills the gap in the servicification literature by analyzing Swedish firm and enterprise group-level data. Contributes to trade policymaking by suggesting inclusive policymaking rather than treating services and manufacturing separately.	Manufacturing has been undergoing substantial servicification. On the input side, qualified services are increasingly an in-house activity. On the output side, manufacturing has been accounting for an increasing share of services in total sales and exports. Enterprise group-level data is significant for understanding structural economic changes.

6	Boddin & Henze (2014)	1975-2010	Empirically analyzes the effects of services on the employment structure in the trade in German manufacturing firms.	Three critical channels through which trade affects the employment structure are identified: import intensity, export intensity, and import exposure.
7	Crozet & Milet (2014)	1997-2007	Using detailed balance sheet data from an extensive panel of French firms, the study examines the production and sales of services by manufacturing firms.	Manufacturing firms have increased their production of services. Of the firms registered in the manufacturing sectors, 83% provide services for third parties, and nearly one-third of these firms provide more services than goods.
8	Lodefalk (2014)	2001-2007	Contributes to the study of servicification by discussing the role of services for firms and empirically testing how service intensity affects the export capabilities of firms, their productivity, and competitive position in the international market.	Provides new firm-level evidence of the role of services as inputs in manufacturing. Service inputs affect firms' export capabilities: raising the proportion of services in in-house production yields higher export intensity on average, and buying-in more services is also associated with higher export intensity for firms in some industries.
9	Anukoonwattaka et al. (2015)	1995-2009	Using the OECD WTO TiVA database, considers how service sector developments have encouraged and promoted industrial exports from Asia-Pacific economies.	The spread of global value chains (GVCs) in the region has resulted in an expansion of servicification across Asia-Pacific developing economies. Distribution-related services and business services are significant service inputs to industrial exports from Asia and the Pacific. Liberalizing services trade would allow cheaper imports of services inputs and facilitate cost-efficiencies in Asia-Pacific, supporting industrial production through GVCs.
10	He et al. (2015)	2011	Using global data from the fifth round of International Manufacturing Strategy Survey, analyzes relationships between organizational empowerment, service strategy, and business performance.	Manufacturers' service strategies are positively related to business performance in both high- and low-intensity competition environments. Organizational empowerment is significantly associated with service strategy, with technological change positively moderating the relationship.
11	Lodefalk (2015)	1975-2007	Reviews the micro-level evidence of servicification by analyzing previous studies on servicification in different countries and discusses policy implications of servicification of firms and their role in foreign trade.	Imported, domestic, and exported services are critical to the competitiveness of manufacturing firms and their participation in international value chains. Historic divides in trade-policy-making between trade in manufactures and services, between offensive and defensive interests, and between modes of

				supply have become antiquated. Product-service integrated trade policy reforms are advised.
12	Crozet & Milet (2017)	1997-2007	Provides systematic evidence of the extent or consequences of servitization based on a comprehensive dataset of French manufacturing firms. Estimates the impact of servitization on firm performance.	The vast majority of French manufacturers sell services in addition to producing goods. The shift toward services is growing slowly but steadily. Besides, a positive impact is found on the production of goods for small businesses.
13	Lodefalk (2017)	1975-2010	Compiling the previous empirical evidence of the impact of services on firm exports, this study suggests essential trade policy implications of servicification.	Finds scope for further research on how firms bundle and deliver manufactures and services, its consequences and complementarity in trade, the impact of servicification on trade margins, and how firms handle duties on services that are embodied in manufactures.
14	Haven & Marel (2018)	2006-2014	Uses a unique firm-level dataset to analyze the link between servicification and productivity in Turkey – a transcontinental nation	Manufacturing firms with service affiliates tend to be less productive in Turkey. The type of services produced matters – firms with post-manufacturing (transport and distribution) service affiliates are notably less productive. Productivity gaps appear in the same areas where services are more restricted, i.e., post-manufacturing services.
15	Thangavelu et al. (2018)	1995-2011	Explores the determinants of and trends in servicification and its links with the GVCs, using sectoral level data across 61 countries with a focus on Asian nations.	Asian countries tend to have a lower level of domestic servicification but a higher level of foreign servicification than OECD countries. Five critical factors drive this trend: participation and position, information and communication technology (ICT), the supply of service workers, regulation quality, and government governance.
16	Ariu et al. (2019)	1995-2005	Shows how the international trade in goods and services interact at the firm level using a rich dataset on Belgian firms, yielding important implications for the design of trade policy	This study finds that i) firms are much more likely to source services and goods inputs from the same country of origin than from different ones; ii) joint imports are associated with higher firm productivity; iii) increases in barriers to imports of goods reduce firm-level imports of services from the same market, and vice versa.

17	Ariu et al. (2020)	1997-2005	Shows that the provision of services increases firms' manufacturing export values, quantities, and prices.	Service provision accounts for up to 22.4% of the manufacturing exports of bi-exporters, and 11.8% of overall goods exports from Belgium. Authors propose a model of oligopolistic competition in which, by supplying services with their goods, firms increase their market share, and hence their market power and markup.
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Note: this table is organized first in chronological order and then in alphabetical order.

Table A3: Results of the internationalization model (fixed effects panel model)

	Baseline	Mediation	Moderation
	(2) Exporter	(3) Exporter	(4) Exporter
Servicification	0.021*** (3.662)		
Domestic servicification		0.009 (0.132)	0.012 (0.168)
Productivity	-0.050*** (-8.349)	-0.050*** (-8.320)	-0.073*** (-6.458)
Mediation effect		0.093*** (3.641)	
Moderation effect			0.001*** (3.359)
Year 2015	0.022*** (3.411)	0.022*** (3.387)	0.022*** (3.435)
No. of Obs.	280	280	280
R-Squared (within)	0.342	0.342	0.333

Source: Own elaboration with BPS data for 2014 and 2015. Notes: Regression results for the internationalization model (columns 2, 3, and 4 correspond to the estimation of Equations 2, 3, and 4, respectively). The mediation effect refers to the estimated coefficient of the prediction of an OLS simple regression of the log of productivity (as dependent variable) on the log of servicification ($\widehat{Productivity}_{it}$), while the moderation effect refers to the estimated coefficient of the interaction ($Productivity_{it} \times Servicification_{it}$) in the internationalization model. *** indicates statistical significance on the 0.01 level. T-statistics are in parentheses.