

Supply chain inclusion in base of the pyramid markets

Supply chain
inclusion

A cluster analysis and implications for global supply chains

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Abstract

Purpose – The purpose of this paper is to explore mechanisms of supply chain inclusion in Base of the Pyramid (BOP) settings. It distinguishes micro-, small- and medium-sized enterprises (MSME)-led local supply chains on the one hand and multinational enterprises (MNE)-led global supply chains on the other hand. This paper aims to answer the following research question: Which mechanisms of supply chain inclusion are employed empirically by MSMEs and how can these mechanisms influence social impact creation in MNE-led global supply chains?

Design/methodology/approach – A large-scale empirical study of MSMEs operating in BOP markets is performed and a cluster analysis conducted to systematically categorize supply chain inclusion. The cluster analysis and current literature yield theory-based implications for MNE-led global supply chains.

Findings – The cluster analysis reveals three meaningful clusters of supply chain inclusion in BOP markets and highlights two main aspects. They include direct vs indirect mechanisms of inclusion and diversity in supplier relationships with local organizations aimed at either “sourcing” local capabilities needed for inclusion or “outsourcing” the inclusion. Based on these aspects, two scenarios are proposed and evaluated for local-global supply chain symbiosis.

Research limitations/implications – This study aims to contribute to the existing literature with a more fine-grained understanding of the inclusion of BOP actors in local supply chains and by proposing alternative trajectories for global supply chain inclusion.

Practical implications – The findings outline several important decisions that managers need to make to include BOP actors in supply chain activities.



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Originality/value – This paper contributes a novel, combined perspective of local supply chains (MSMEs) and global supply chains (MNEs).

Keywords Inclusion, Base of the Pyramid

Paper type Research paper

Introduction

The idea of inclusion of actors from marginalized groups at different stages of supply chains has recently been emphasized by developments in both practice and academia. From a practical perspective, the concept of inclusivity has gained prominence within the international development and policy discourse. As shown in a content analysis comparing key texts from the Millennium Development Goals with those from the Sustainable Development Goals, the latter mentions inclusivity ten times more than the former (Heeks, 2014). From an academic perspective, scholars in innovation and development studies distinguish between mainstream and inclusive innovation, where only the latter focuses on the inclusion of actors from marginalized groups in business model and supply chain development (Heeks *et al.*, 2014; George *et al.*, 2012). The term “marginalized actors” is defined as individuals, households or groups which can be found in “disenfranchised sectors of society” and “have structurally been denied access to resources, capabilities, and opportunities” (George *et al.*, 2012, p. 661). Marginalized groups frequently include women, the disabled, ethnic minorities, informal sector entrepreneurs and those on lowest income levels in the economic pyramid (Heeks *et al.*, 2014). From a supply chain management (SCM) perspective, the inclusion of actors from marginalized groups has been brought to the forefront by the Base of the Pyramid (BOP) debate.

BOP is defined as the almost 4bn people who live on less than \$1,500 per year (Prahalad and Hart, 2002). BOP markets are characterized by largely underdeveloped formal institutions, where socioeconomic activities are guided by informal structures (London *et al.*, 2014). In this study, the focus is on BOP as one particular group which has been historically marginalized or excluded from mainstream models of value creation (Heeks *et al.*, 2014). The current literature presents several cases of supply chain inclusion where BOP can serve as producers and suppliers of critical raw materials (Hall and Matos, 2010), distributors and consumers of products (Gold *et al.*, 2013) or enablers of reverse logistics activities (Brix-Asala *et al.*, 2016).

Inclusion of BOP actors in supply chain activities is an important topic because it can be essential for social impact creation in developing economies (Nahi, 2016). Yet, current studies also show that the inclusion of vulnerable BOP actors presents companies outside the BOP market with severe difficulties. However, it is not clear which mechanisms and which stakeholders are better equipped to drive the supply chain inclusion of marginalized actors. In order to address this gap, the current study explores mechanisms of the supply chain inclusion of marginalized actors in BOP settings. A distinction is made between micro-, small- and medium-sized enterprises (MSMEs)-led local supply chains and multinational enterprises (MNEs)-led global supply chains in order to build on current findings. These findings suggest that MNEs face severe difficulties when attempting to embed and integrate their global mindsets with local characteristics of informal markets (Parmigiani and Rivera-Santos, 2015), while MSMEs, on the account of their small size and flexible organizational structure, may be in a better position to integrate BOP actors into their supply chains (see, for a review, Rosca *et al.*, 2017; Kolk *et al.*, 2014). In this sense, this study investigates mechanisms of the supply chain inclusion by MSMEs active in BOP markets and it discusses implications for MNEs who aim to expand to BOP markets. Therefore, this paper aims to answer the following research question:

RQ1. Which mechanisms of supply chain inclusion are employed empirically by MSMEs, and how might these mechanisms influence social impact creation in MNE-led global supply chains?

In order to answer this research question, this study is conducted in three stages. First, a large-scale empirical study of MSMEs operating in BOP markets is performed. Using a rich data set of 134 MSMEs, cluster analysis techniques are employed in order to systematically categorize supply chain inclusion and to identify meaningful configurations. In this study, exploratory cluster analysis is employed to identify patterns in the data and make inferences related to supply chain inclusion in BOP markets. While exploratory cluster analysis does not involve hypotheses development and testing, the value of this technique lies in mapping patterns in a data set while including multiple variables as drivers of configuration definition with rich descriptions of configurations (Ketchen and Shook, 1996). This approach, also known as “problem-driven research” (Davis and Marquis, 2005) is especially suitable for exploratory research in an emerging research area of interest.

Second, based on the cluster analysis results, two main aspects for MSME-led supply chain inclusion are highlighted: direct vs indirect mechanisms of inclusion and diversity in supplier relationships with local organizations aimed at either “sourcing” local capabilities or “outsourcing” the inclusion. Third, cluster analysis along with the two outlined aspects is employed in order to inform theory-based implications for MNE-led global supply chains, highlighting in particular the potential benefits, risks and challenges for social impact created in local BOP markets associated with different trajectories of global-local supply chain inclusion. The interpretation of the cluster analysis together with the implications for global supply chains are developed by building extensively on the current literature in order to account for limitations inherent to the sample.

This study responds to recent calls for investigating supply chain issues in poverty settings (Sodhi and Tang, 2016; Fawcett and Waller, 2015). Moreover, the study has important implications for managerial practice by outlining two important decisions related to the design of supply chain inclusion with essential implications for supply chain complexity and social impact creation.

This paper is structured in eight sections. This introduction follows a review of the literature. The third section describes the data collection, the characteristics of the sample and the steps undertaken for the cluster analysis. The fourth section profiles the three clusters of BOP enterprises, while in the fifth section five, two main aspects emerging from the interpretation of the clusters are presented. The sixth section discusses implications for global supply chains of MNEs based on the clusters and emerging issues. The paper concludes with a discussion of the theoretical contributions of this study and further research ideas.

Literature review

Inclusion of marginalized actors in MNE-led global supply chains

Although topics of inclusion and local participation have gained momentum in both academia and practice, only a few empirical studies adopt the SCM perspective and inclusion of impoverished actors. Building on these and other key studies from international business and strategy literature, several important findings can be outlined concerning the inclusion of BOP actors in MNE-led global supply chains. First, MNEs face significant challenges when operating in BOP markets and including BOP in their supply chains. MNEs often lack the skills and capabilities needed in order to embed and co-create locally relevant value propositions and to build on local structures (Venn and Berg, 2013). They also face difficulties related to the lack of global standards enforcement (Prahalad, 2012). Additionally, they need to develop “an active assistance approach” in order to enable the adoption of global standards at the BOP level (Perez-Aleman and Sandilands, 2008). The lack of commitment of top management of MNEs toward BOP inclusion due to long return horizons also presents challenges (Hart *et al.*, 2016; Olsen and Boxenbaum, 2009).

Additionally, existing power and knowledge asymmetries between the local BOP actors and MNEs present barriers for knowledge diffusion between impoverished actors and other supply chain members (Hall and Matos, 2010).

In spite of all the challenges faced by MNEs to engage local BOP in their value creation activities, their efforts may be essential to drive sustainable development and poverty alleviation efforts in BOP markets (Nahi, 2016). Critics of the initial BOP proposition argue that the only way to eradicate poverty is to provide steady employment and reasonable wages, to help increase productivity levels and to strengthen capabilities and freedoms along social, cultural and political dimensions (Karnani, 2007). Inclusion of marginalized BOP in supply chain activities can provide such opportunities. Supply chain inclusion mechanisms can enable the creation of social impact in global supply chains. Social impact is as the positive effects of different activities on sellers (local distributors or producers), buyers (local consumers or agents) and communities (London, 2009). These effects can refer to potential changes in economics (e.g. income, productivity), capabilities (e.g. skills, knowledge, self-esteem) and relationships (e.g. social status, access to networks) (London, 2009).

Second, local non-business partners can play an important role by contributing local knowledge and capabilities (Parmigiani and Rivera-Santos, 2015). In particular, non-business partners frequently undertake activities that require close connection with the local context (Hahn and Gold, 2014). These activities include access to distribution networks, demand studies, social marketing and education campaigns, facilitating partnerships and value chain activities. Typical non-business partners are NGOs and government agencies who can use their local knowledge to re-conceptualize supply chains and fit them to the constraints of BOP markets (Gold *et al.*, 2013). Yet, partnerships between for-profit MNEs and non-profit organizations can be challenging because a common ground of resources, values and processes is needed and different organizational identities may result in uneven expectations and goals (Le Ber and Branzei, 2010).

Third, MNEs tend to include BOP actors in either upstream processes (BOP as suppliers) or downstream processes (BOP as distributors), but rarely both. Case studies from literature illustrate examples of supply chain inclusion of BOP actors as either producers/suppliers of raw materials or as distributors through women-led door-to-door distribution models (Parmigiani and Rivera-Santos, 2015; Gold *et al.*, 2013; Hall and Matos, 2010). In particular, distribution models based on local networks of micro-entrepreneurs (frequently women) are often presented as key mechanisms to address the lack of infrastructure and to mobilize the strength of social ties in informal markets (Bendul *et al.*, 2016; Prahalad, 2012; Seelos and Mair, 2007).

Altogether, the inclusion of local BOP actors in global supply chains presents significant barriers for MNEs in regards to institutional voids, informal market characteristics, power and knowledge asymmetries and top management commitment. While non-business partners often mediate the relationship between MNEs and local BOP actors, different organizational mindsets and goals between for-profit and non-profit organizations can create further tensions. Supply chain inclusion of local BOP actors can serve as mechanisms to overcome local barriers, but more importantly can enable the creation of social impact in BOP communities.

Inclusion of marginalized actors in MSME-led local supply chains

Recent empirical work suggests that key organizations for supply chain inclusion and local development in BOP markets are MSMEs (see, for a review, Rosca *et al.*, 2017; Kolk *et al.*, 2014). Various aspects of local supply chains of MSMEs (e.g. distribution, sourcing from smallholder farmers, partnerships and social impact) have received more attention from social

entrepreneurship and sustainable business research streams and less attention in the SCM literature. Insights from these research streams indicate a large diversity in terms of organizational models (e.g. for-profit initiatives, social enterprises). MSMEs in BOP markets have real potential to enable local supply chains through access to credit, market information and market access, and to achieve higher productivity through provision of new technologies and equipment (Sodhi and Tang, 2011). Additionally, due to their small size and flexible organizational structure, MSMEs are in a better position to engage with local BOP actors. Yet, their own survival is at risk due to challenges related to lack of capital and capabilities for scaling.

When exploring supply chain inclusion mechanisms employed by MSMEs in BOP markets, several analytical constructs from the literature emerge (see Table I). First, marginalized actors are central to supply chain inclusion. A core tenet of the inclusivity narrative relates to the inclusion of actors from BOP communities. Some scholars argue that, by definition, inclusion in BOP markets should engage low-income consumers (Kolk *et al.*, 2014). Building on insights from marketing and service science and aligned with the evolution of BOP first- and second-order generation strategies, a distinction can be made between behavioral inclusion and value chain inclusion. On one hand, when a firm aims to provide products and services to BOP consumers, it may engage in traditional information-sharing activities, where customers provide/share information, make suggestions and are involved in the decision making (Chan *et al.*, 2010). On the other hand, supply chain inclusion refers to the actual integration of BOP customers at different stages of the value chain (Lau *et al.*, 2010). A focus on behavioral inclusion can identify enterprises which address inclusion concerns through the provision of products and services to BOP consumers, while value chain integration of BOP consumers can address challenges related to empowering, rapport-building and quality (Nahi, 2016). The differentiation between behavioral inclusion and value chain integration is valuable in order to place inclusion activities on a continuum. Since consumer integration into value chain activities requires behavioral participation, it is more likely that some firms will engage only in behavioral inclusion, while others will take it further and engage BOP consumers as suppliers, producers, distributors and service providers (Simanis and Hart, 2008).

Second, MSMEs can engage in partnerships with MNEs who have resources, capabilities and knowledge for scaling, business development and international expansion and can help MSMEs grow their economic and social impact (Seelos and Mair, 2007). Third, there are cross-sector partners, such as local NGOs, community associations and knowledge institutions, which are known to have knowledge of local systems and structures and to have legitimacy (Rosca and Bendul, 2018). MSMEs often engage in

Analytical constructs for local supply chain inclusion in bop markets		Type of data
1a) Supply chain inclusion	Behavioral inclusion	Numeric, 7-point Likert scale
1b) Supply chain inclusion	Inclusion in value creation activities	Numeric, 7-point Likert scale
2) Global partnerships	Global MNE	Binary
3) Non-business partnerships	NGOs	Binary
	Community associations	
	Government	
	Knowledge Institutions	
4a) External variables	Industry/themes – sustainable energy, education, food, employment, technology, health	Binary
4b) External variables	BOP models – consumer vs supplier approach	Binary

Table I.
Analytical constructs for supply chain inclusion in MSMEs-led local supply chains and the corresponding data type

partnerships with local cross-sector partners and leverage their resources and capabilities in order to acquire local knowledge, legitimacy and connections with BOP consumers (London *et al.*, 2010).

Current studies also suggest that supply chain inclusion mechanisms may take different forms, depending on the industries involved (Nahi, 2016) and whether BOP is a market for selling goods (a consumer approach) or a producer to be potentially sourced from (a supplier approach) (London *et al.*, 2010).

Research gaps and objectives

While the role of MSMEs has gained importance in BOP contexts, the literature review outlines the challenges that MNEs face when attempting to integrate marginalized actors into their supply chains. The increasing role of MSMEs is supported not only by recent studies (Rosca *et al.*, 2017; Kolk *et al.*, 2014) but also by numerous awards, incubators and accelerator programs targeting market-based initiatives in BOP markets. Therefore, the goal of this paper is to investigate supply chain inclusion mechanisms in BOP markets and to inform MNEs about how they can facilitate the inclusion of BOP actors by building on the structures already developed by local MSMEs. Thereby, the paper contributes a novel perspective on local supply chains of MSMEs and links the debates on local and global supply chains by proposing partnership trajectories between MNEs and MSMEs, thereby discussing the implications and trade-offs for social impact creation.

Methods

In order to develop a meaningful classification of MSMEs in BOP, a four-stage research design is employed. Stage 1 encompasses the data collection process, descriptive analysis of the sample and measures used for the clustering variables. In this study, the selection of clustering variables is guided by the literature through the analytical constructs outlined in Table 1, and therefore, a deductive approach for the selection of the clustering variables is employed (Brusco *et al.*, 2017). Stage 2 entails the selection of clustering algorithms and determining the number of clusters. Stage 3 explains the tests conducted to assess the internal validity of the obtained cluster solution. Finally, in Stage 4, *post hoc* tests are employed in order to identify statistically significant differences between the clusters and conduct additional analyses to explore relationships between the clusters and other external variables.

Stage 1: data collection

The units of analysis for this study are MSMEs that operate in BOP markets. An online questionnaire was designed for this target group of respondents. The selection of respondent MSMEs employs a purposive sampling approach, where subjects are selected based on pre-specified criteria (Black, 1999). These criteria are as follows: First, the enterprises can have up to 250 employees[1] and can address BOP issues through consumer or supplier models, as described in the literature review. Second, these enterprises can be local or foreign with headquarters in industrialized countries but with small-scale production facilities or local branches in BOP settings. Third, the targeted enterprises need to have a profit orientation, or at least the intention of being profitable and achieving self-financing growth through retained earnings.

In order to find MSMEs that fit these criteria, databases with case studies and online platforms showcasing BOP enterprises were screened[2]. This resulted in a total sample of 1089 enterprises operating in BOP markets across various geographical regions and industries. The survey was administered between August and November 2016, mainly in two stages, and it recorded responses from 175 BOP ventures. The questionnaire was tested in several rounds with both practitioners and academics before the application. In the first stage, the online

questionnaire was sent via e-mail to the respondents together with a text explaining the background of the study and promising them the results of the study. Due to a low response rate during this stage (6 percent, 36/623), in the second stage, personal emails were sent out, addressing the founders/directors of the enterprises. This stage resulted in a higher response rate of 38 percent (139/367). After excluding incomplete and insufficient quality responses, the final sample used for this study consists of 134 enterprises. It presents a representative distribution across various characteristics (see Appendix 1). The sample also presents a focus on Africa and South Asia, with young, small and mostly stand-alone enterprises.

In order to evaluate the representativeness of the sample, the sample characteristics of this study were compared with samples from similar studies. This sample is very comparable with the study conducted by De Beule and Verwaal (2014) in terms of the enterprises' age, size, sectors and geographical focus. The characteristics of the respondents along with the small size of enterprises suggest that respondents had in-depth knowledge of the enterprises and its related activities. Owners, managing directors, founders, executive directors and chairpersons filled out 59 percent of the questionnaires. In total, 31 percent of the questionnaires were completed by internal managers responsible for specific areas in the companies, such as IT, marketing or technical issues, or regional project managers. The remaining 10 percent of the questionnaires were returned by other actors with intimate knowledge of the firms (e.g. impact advisors, researchers, lawyers). In order to check for potential non-response biases in the sample, the extrapolation approach was employed (Armstrong and Overton, 1977). Several χ^2 group tests between early and late respondents did not reveal any differences (all $p > 0.05$). Therefore, one can conclude that there is not enough evidence to suggest the existence of non-response bias.

Measures

This study employs data from the questionnaire related to information-sharing activities, value chain inclusion and partnerships with business and non-business actors. Moreover, data were collected on the type of BOP model employed and the industry. The type of data used for all variables can be found in Table I.

In order to measure value chain inclusion, items from existing studies on consumer integration were adapted based on the testing rounds of the questionnaire with academics and practitioners. Behavioral inclusion indicators are adapted from Chan *et al.* (2010), while value chain integration items are inspired from Lau *et al.* (2010)[3]. The final items used for value chain inclusion along with the reliability indicators can be found in Appendix 2. Descriptive statistics for all data before scaling can be found in Table II.

	Sample size	Mean	SD	Median	Min.	Max.
NGOs	134	0.403	0.492	0	0	1
Community associations	134	0.313	0.466	0	0	1
Government	134	0.157	0.365	0	0	1
Knowledge institutions	134	0.149	0.358	0	0	1
MNE	134	0.701	0.459	1	0	1
A1: joint product and service innovation	134	4.493	1.767	5	1	7
A2: joint sourcing	134	3.716	2.087	4	1	7
A3: joint production	134	4.299	2.041	5	1	7
A4: joint promotion	134	4.769	1.798	5	1	7
A5: joint distribution	134	4.119	2.081	4	1	7
B1: sharing information and opinions	134	4.410	1.908	5	1	7
B2: sharing personal needs	134	4.000	1.872	4	1	7
B3: suggestions to improve products and services	134	4.276	1.787	4	1	7

Table II.
Descriptive statistics
of the raw data items
(before scaling)

To evaluate partnerships with business actors, respondents were asked if their organization collaborates with MNEs. While for partnerships with non-business partners were asked to select the cross-sector partner with whom they work most closely from NGOs, community associations, governments and knowledge institutions. Measuring the external variables “sectors” and “BOP approach” proceeded as follows. In the questionnaire, respondents were asked to describe the main product/service that they provide and the mission of the enterprise. Based on these two categories, the approach of (Mair, Battilana and Cardenas, 2012) was followed and enterprises classified into six themes, namely, sustainable solutions, education, food, employment, technology and health. Several enterprises were coded within more than one theme, since this was often the case. For example, a technological venture addressing healthcare issues was coded as both technology and healthcare. Lastly, a question was included to differentiate between consumer and producer models in BOP markets. However, during the testing of the questionnaire, an additional option was added, namely, that of intermediaries, since it became clear that numerous enterprises in BOP markets offer products and services for BOP consumers, but due to affordability constraints, the actual customers are intermediaries (NGOs, governments, etc.).

Stage 2: cluster analysis – determining the number of clusters

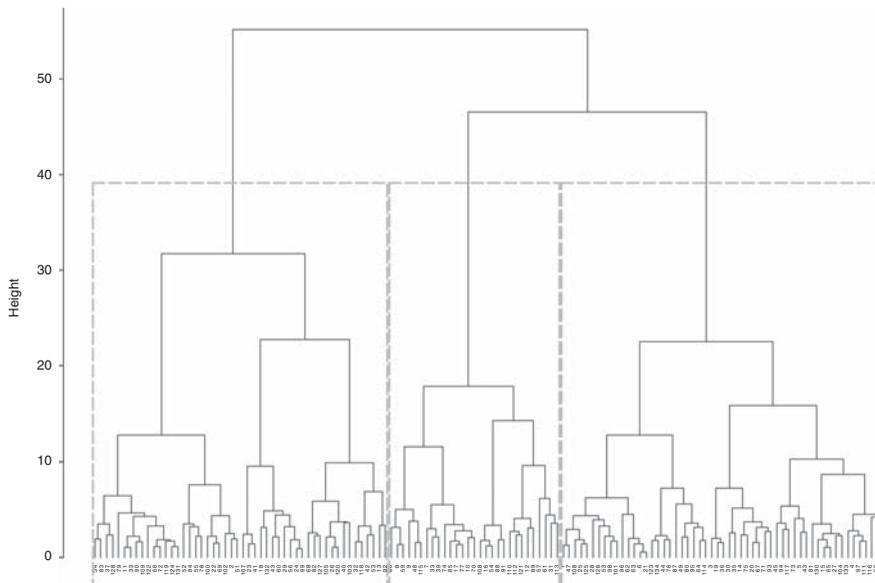
As the first step to conduct cluster analysis, the variables were standardized using Z-scores (Brusco *et al.*, 2017) and a correlation analysis conducted in order to evaluate preliminary relationships between the main variables (Möllering, 2003). To determine the proximity (similarity or dissimilarity) between the observations, each observation is represented by its scaled vector of constructs. The dissimilarity (distance) between two observations is calculated as the Euclidean distance (L2 norm) between the observations (Lattin *et al.*, 2003). A partial distance matrix of 15 observations is presented in Table AI; a full version is available upon request.

In order to determine the number of clusters, the two-stage procedure recommended by Brusco *et al.* (2017) was followed. The number of clusters is determined in the first stage using hierarchical clustering. Then, the final clusters are determined with *K*-means clustering with known number of clusters. For the hierarchical clustering, Ward’s method is employed to select an appropriate number of clusters (Lattin *et al.*, 2003). Ward’s method is chosen as it has been known to be superior compared to other methods such as single, average and complete linkage in several simulation studies (Ferreira and Hitchcock, 2009).

Two stopping rules are used to identify the number of clusters – the index of Caliński and Harabasz (1974) and the elbow method for the intra-cluster variation (Hennig, 2007). The approach of Caliński and Harabasz (1974) employs a ratio of total variance between the clusters and total variance within clusters, and a large value for the ratio shows more distinct clusters better (Mair, Martí and Ventresca, 2012; Mair, Battilana, and Cardenas, 2012). Both approaches employed for stopping rules suggest a three-cluster solution. The three clusters from the hierarchical clustering can be visualized in the rooted dendrogram illustrated in Figure 1. Using multiple approaches for determining the number of clusters increases the confidence in the solution and overcomes the limitations of using a single method (Ketchen and Shook, 1996). Actual clusters are determined via the *K*-means clustering method, with the centroids determined by the hierarchical cluster analysis with 5,000 re-starts (Brusco *et al.*, 2017). As a result of this procedure, the 134 observations are classified into three clusters of MSMEs.

Stage 3: internal consistency

In order to evaluate the internal consistency of the three-cluster solution, discriminant analysis and ANOVA are performed as additional multivariate techniques (Mair, Battilana and Cardenas, 2012; Hambrick, 1983). Using the discriminant analysis with 50 percent randomly



Note: Dotted lines demarcate the three cluster solution

Figure 1.
Rooted dendrogram
from hierarchical
clustering

sampled training data and the complementary testing data, 90 percent of the observations were classified accurately into the cluster they belonged to in the K -means clusters. Furthermore, the internal consistency of the cluster solution was investigated by measuring the internal stability of the clusters. The original data set was bootstrapped 100 times with replacement, and the K -means clustering was performed with 5,000 re-starts each time. The bootstrapped means of the Jaccard similarity index for the three clusters are 0.78, 0.83 and 0.75, respectively. Therefore, the three-cluster solution approach is robust and reliable. The high Jaccard similarity index[4] (Hennig, 2007) of the clusters determined from the bootstrap compared to the original clusters indicates that each of the clusters is valid and stable. The ANOVA test of variables across the clusters shows that only one variable is not significantly different across clusters (collaboration with MNEs).

Stage 4: external validity – profiling the clusters

Additional analyses were conducted in order to explore statistically significant differences between the three clusters. Multiple pair-wise comparisons based on *post hoc* tests are employed for this purpose (Gabriel's[5] or Games–Howell[6] tests). The selection of *post hoc* tests is determined by the result of the Levene's test of homogeneity of variances[7], namely, the assumption of equal variances (Field, 2013).

In order to enhance the external validity of the cluster solution, additional tests were conducted with external variables not used in defining the clusters. This approach reduces researcher's judgments and biases and is regarded as superior (Brusco *et al.*, 2017; Ketchen and Shook, 1996). In this sense, the three clusters were cross-tabulated with external variables "BOP approach" and "themes," and Cramér's V [8] index is employed to assess the strength of association between different variables (see Table IV). These analyses help to gain a more nuanced picture of the individual clusters. Furthermore, several discussions with academics were conducted in order to evaluate the external validity of the clusters.

Findings of the cluster analysis: three-cluster solution approach

In this section, the results are revealed in terms of the three-cluster solution approach. The clusters differentiate themselves in regard to both the clustering (the value chain inclusion levels and non-business partnerships employed) and external variables (BOP approach and themes). The particularities of each cluster are briefly described below based on several examples from the sample.

Findings reveal three clusters of value chain inclusion in BOP markets (see Table III). Using Cramér’s *V* index as a measure of association, significant differences were found between the clusters in terms of employed BOP approach (Cramér’s *V* = 0.323, sig. = 0.000). A more detailed overview is shown in Table IV, and this reveals that Cluster 1 is driven by a consumer approach, Cluster 2 by both a producer and an intermediaries approach and Cluster 3 by a mix of a consumer and an intermediaries approach. Additionally, tests were done to analyze the differences between the clusters in regard to their themes.

Variables and attributes	Cluster 1 (<i>n</i> = 46)	Cluster 2 (<i>n</i> = 47)	Cluster 3 (<i>n</i> = 41)	<i>F</i> -test	Levine’s test	<i>Post hoc</i> test: Games–Howell or Gabriel’s test
<i>Partners: business and non-business</i>						
MNC	0.63 (0.49)	0.74 (0.44)	0.73 (0.45)	<i>p</i> > 0.05	<i>p</i> > 0.05	na
NGO	0.04 (0.21)	0.28 (0.45)	0.95 (0.22)	94,234***	38,888***	CL3 > CL1, CL2; CL2 > CL1
Community associations	0.52 (0.50)	0.38 (0.49)	0.00 (0.0)	18,130***	699,507***	CL1 > CL3; CL2 > CL3
Government	0.24 (0.43)	0.21 (0.41)	0.00 (0.0)	5,916***	46,893***	CL1 > CL3; CL2 > CL3
Knowledge institutions	0.30 (0.46)	0.13 (0.34)	0.00 (0.0)	8,932***	57,945***	CL1 > CL3; CL2 > CL3
<i>Behavioral inclusion</i>						
Sharing information and opinions	5.54 (1.36)	2.66 (1.46)	5.15 (1.39)	56,967***	<i>p</i> > 0.05	CL1 > CL2; CL3 > CL2
Sharing personal needs	5.24 (1.29)	2.49 (1.44)	4.34 (1.68)	42,228***	<i>P</i> > 0.05	CL1 > CL2, CL3; CL3 > CL2
Suggestions to improve products and services	5.63 (1.10)	2.94 (1.45)	4.29 (1.61)	43,179***	3,603***	CL1 > CL2, CL3; CL3 > CL2
<i>Value chain inclusion</i>						
Joint product/service innovation	5.59 (1.39)	3.17 (1.45)	4.78 (1.50)	33,529***	<i>p</i> > 0.05	CL1 > CL2, CL3; CL3 > CL2
Joint sourcing	4.78 (1.94)	2.57 (1.70)	3.83 (2.08)	16,068***	<i>p</i> > 0.05	CL1 > CL2, CL3; CL3 > CL2
Joint production	5.48 (1.35)	2.79 (1.82)	4.71 (1.89)	31,060***	5,504***	CL1 > CL2; CL3 > CL2
Joint promotion	5.74 (1.06)	3.32 (1.80)	5.34 (1.35)	37,138***	9,742***	CL1 > CL2; CL3 > CL2
Joint distribution	5.30 (1.71)	2.53 (1.56)	4.61 (1.87)	32,971***	<i>p</i> > 0.05	CL1 > CL2; CL3 > CL2
Note: <i>p</i> < 0.001						

Table III.
Clusters for value chain inclusion of MSMEs in BOP markets

External variable	Cluster 1	Clusters Cluster 2	Cluster 3	Total
Consumer-based model	34	11	21	66
Producer-based model	3	17	5	25
Intermediaries-based model	9	19	15	43
Total	46	47	41	134

Table IV.
Profiling clusters based on external variables – BOP approach

Differences were found in regard to employment (Cramér's $V=0.238$, sig. = 0.022) and technology (Cramér's $V=0.226$, sig. = 0.032). This analysis reveals that technology ventures are in Cluster 1 (54 percent) and employment ventures belong to Cluster 2 (57 percent).

Cluster 1 – direct inclusion network (DIN)

Cluster 1, DIN, differentiates itself through very high levels of both behavioral and value chain inclusion and a wide and diverse network of non-business partners supporting the inclusion. Typical offerings include organic fertilizers, briquettes, clean cooking fuel and stoves, solar lamps, heating and rural electrification. These enterprises offer products and services directly to BOP consumers and address various aspects related to education, namely health awareness, ecological education and agronomic advice. Several of these enterprises operate in the agriculture/agri-business sector. They support farmers with information, technologies, input, advice, training, materials and related information to increase farmers' productivity and/or to educate them on agri-business issues. These MSMEs are very difficult to be classified into given industries or sectors because they provide a wide range of solutions for BOP customers. A typical example of the organizations in this cluster is an enterprise located in South East Asia, called Agrottrain (pseudonym). Its main aim is to train smallholder farmers and increase their incomes and productivity. This social enterprise offers a wide range of services for farmers including irrigation products, farm advisory services, financial services, rural energy, infrastructure and economic research.

Cluster 2 – indirect inclusion network (IIN)

Cluster 2, IIN, differentiates itself through low levels of both behavioral and value chain inclusion and a wide network of non-business partners supporting the inclusion. This cluster includes MSMEs which follow the supplier- or intermediaries-based models, where products and services are either sourced from the BOP producers and commercialized to higher income markets or they are sold to intermediaries (NGOs, governments) and then distributed/sold at very low price to BOP consumers. In the case of the producer-type of enterprises, their aim is to offer education training and employment opportunities for local farmers and artisans while opening access to new markets for their own products/services. Their network of non-business partners is also very wide and includes a variety of partners who handle specific issues. They often target rural farmers, artisans, women and other actors from marginalized groups, and sourced products include cocoa, tea, coffee, garments and peanut butter. They are known to engage closely with NGOs and other local partners. A typical example would be Solarity (pseudonym), incubated by a large foundation and aiming to make energy available at affordable prices in remote areas in Africa. It works together with several international and local NGOs, and employs local entrepreneurs as distributors for its products in remote areas.

Cluster 3 – direct NGO collaboration (DNC)

Cluster 3, DNC, distinguishes itself through high levels of behavioral and value chain inclusion and a single type of partner – NGOs with various competencies and networks. This cluster includes MSMEs which offer basic needs services, including nutritious food products, water, waste services and sanitation, last mile healthcare, sanitary pads, sanitation, water treatment systems, electricity, solar pump systems – services and products which traditionally have been in the repertoire of NGOs. The relationship of these enterprises with NGOs can be traced back to different scenarios: enterprises founded together with an NGO or organizations that transitioned from an NGO model to a social business. A typical example of an enterprise in this cluster is Puraqua (pseudonym) in Central America, which is a social company committed to providing drinking water to

rural BOP. Its customers are people in remote areas with no access to clean drinking water, and its offering includes a water filter used to remove contaminants from water. It works together with local NGOs to select and train women entrepreneurs as sales agents.

Understanding supply chain inclusion in BOP markets

Regarding the three-cluster solution approach based on the empirical study, two main aspects are highlighted as different mechanisms in order to solve core issues of supply chain inclusion of actors from marginalized groups: the chain of responsibility for the inclusion and diversity issues in supply chain partnerships.

Direct vs indirect supply chain inclusion

This study suggests that there are two main approaches to value chain inclusion. It is distinguished between direct and indirect inclusion based on the chain of responsibility for the inclusion. Direct inclusion refers to situations in which focal companies directly engage in inclusion activities with BOP and are only supported by local partners for different activities (DIN and DNC). In the case of indirect inclusion, the focal firms do not engage in inclusion themselves but rather “outsource” the inclusion to local partners (IIN). The indirect inclusion can take up different forms, whereby MSMEs can distribute products to BOP consumers through local micro-entrepreneurial distribution networks managed by NGOs or can create new markets for agricultural products of smallholder farmers. Both direct and indirect mechanisms of inclusion represent two potential ways to solve the supply chain inclusion in BOP markets, and each entails benefits and challenges for both the firm and the social impact created in local communities.

One interesting aspect highlighted by DIN cluster, which directly engages in inclusion activities, is the idea of “inclusion as an end or inclusion as a means to an end.” MSMEs in DIN cluster tend to be inclusive across all value chain stages rather than being inclusive in a single stage (e.g. distribution). One example of this typology of enterprises can also be the inclusive value chain example cited by Bendul *et al.* (2016): Toyola, a local enterprise from Ghana which produces cooking stoves. Its truly inclusive value chain illustrates how local BOP are engaged at every stage: stoves are made, sold, used, managed and maintained by local, independent, self-employed artisans. It is very likely that these types of MSMEs perceive BOP inclusion as their main value proposition and the products/services offered are only the means through which inclusion can be materialized. With this inclusion, MSMEs aim to drive social impact through empowerment and local capacity building. The indirect form of inclusion, where MSMEs “outsource” the function of integrating BOP across the supply chain, raises important aspects, namely, the attribution of social impact and lack of control over extended supply chain networks, while the fact that some MSMEs create employment and opportunities for the BOP indirectly through partners does not necessarily imply they are not inclusive or the legitimacy of any social impact claims can be questioned.

Diversity issues in inclusive supply chains

The findings highlight several tactics that MSMEs employ to address complexities caused by diverse organizational logics and modus operandi. The clusters reveal the issue of maintaining relationships with single or multiple types of organizational logics which can be observed between DIN and DNC clusters. In order to source the local capabilities needed to enable supply chain inclusion, some MSMEs tend to engage extensively with a wide range of partners (DIN), while others rely on key NGOs who can handle all the local issues by leveraging on their extensive local network (DNC). The aspect of collaborating with multiple partners is also valid for IIN cluster where in order to ‘outsource’ the inclusion, MSMEs still need to collaborate with a variety of partners. Between IIN and DNC, there are

two approaches to partnerships – multiple partners who handle specific issues, or a single large partner with diverse competencies (Parmigiani and Rivera-Santos, 2015).

On one hand, firms in BOP markets do sometimes choose only one single large organization as a partner instead of working with multiple partners since this can be more cost-effective than identifying and developing partnerships with multiple organizations (Parmigiani and Rivera-Santos, 2015). This is particularly relevant if there are large NGOs like BRAC or Grameen in Bangladesh who have extensive knowledge of local structures, systems and even connections in the government. An example of this type of value chain inclusion includes the case of Vision Spring, a social enterprise from India, who scaled up its distribution network quickly and very efficiently by collaborating with one of the world's largest NGO – BRAC. BRAC helped Vision Spring sell their eyeglasses by leveraging their wide network in rural Bangladesh (Sodhi and Tang, 2011).

On the other hand, working with multiple partners, MSMEs can leverage on a wider range of resources and capabilities. Yet, dealing with multiple type of partners with different goals, demands and interests can result in issues of “stakeholder ambiguity” (Matos and Hall, 2007). Furthermore, additional costs may incur due to resources and capabilities needed to identify, select and retain multiple partners for different stages of the supply chain.

Implications for MNE-led global supply chains

Previously, the literature has suggested that MNEs can tap BOP markets through NGO collaborations. However, the results of the cluster analysis and the issues outlined above suggest that the most effective and efficient way to tap local value chains is through existing MSMEs (for earlier work advocating this approach, see Seelos and Mair, 2007). Collaboration with MSMEs can create partnerships with synergistic effects for the involved stakeholders and may present fewer challenges for MNEs due to similar logics and governance structures in contrast to collaboration with NGOs. The lack of economies of scale, specialization, training and knowledge required to increase productivity in local supply chains is a key challenge for local MSMEs to survive economically and therefore to sustain their impact (Karnani, 2007). By integrating global competences of MNEs and local expertise of MSMEs, economies of scale and scope and higher productivity levels can be achieved and thereby social impact created in BOP settings.

Following this narrative, the cluster analysis findings suggest two main scenarios for local-global supply chain symbiosis enabled by MSMEs, as shown by Figure 2. While the two scenarios can result in important benefits for MNEs (Table V), there are also challenges to be overcome. The challenges can result in trade-offs for social impact created in BOP communities. Scenario 1, where MNEs integrate into their global supply chains local MSMEs which directly engage BOP actors, can result in valuable synergies by combining

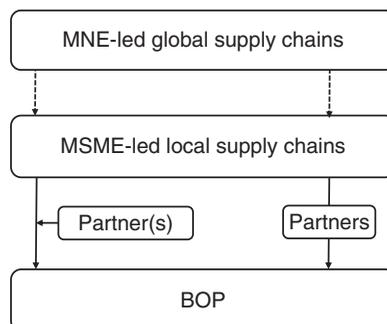


Figure 2.
MSMEs as connectors
of global and local
supply chains

Implications for global supply chains (MNE perspective)	Scenario 1: MSMEs direct inclusion	Scenario 2: MSMEs indirect inclusion
Benefits	Easier access to local communities and thus higher network resilience for the MNE (Rivera-Santos and Rufin, 2010) Access to local supply chains, thereby providing resources for scaling local supply chains (Seelos and Mair, 2007) Access to a wider range of resources and local contact base	Ensuring continuous flow and quality of goods coming from BOP farmers (Sodhi and Tang, 2011) Access to local producers without direct local interaction Access to local networks with a variety of partners and benefit from different approaches, mindsets, and capabilities sets (Rivera-Santos and Rufin, 2010)
Risks and challenges	Resources and capabilities to identify, select and retain multiple partners for different stages of the supply chain Knowledge diffusion between external firms and local actors (Hall and Matos, 2010) Informal partnerships and governance mechanisms (Hahn and Gold, 2014) “Stakeholder ambiguity” – wide range of stakeholders with different goals, demands and interests (Matos and Hall, 2007) Complex networks to manage (Rivera-Santos and Rufin, 2010) Challenges to forging long-lasting partnerships while bridging different organizational cultures and logics (Hahn and Gold, 2014)	Long chain of intermediation becomes difficult to manage and control Accountability issues and lack of control over the supply chains (Parmigiani <i>et al.</i> , 2011) Ensuring the adoption of global standards and certifications (Perez-Aleman and Sandilands, 2008) Managing conflicting pressures coming from different stakeholders (Carter and Rogers, 2008) Horizontal and vertical diversification (Rivera-Santos and Rufin, 2010)
Social impact – opportunities and challenges	Promotion of inclusive global value chains by upgrading economically, socially and environmentally lower-level firms in the value chain (Gereffi and Lee, 2012) Lower power relations and engagement with “fringe stakeholders” implies lack of capacity to influence policy and government regulations (Hart and Sharma, 2004)	Supplier development programs to ensure quality and flow of goods (Parmigiani and Rivera-Santos, 2015) Enabling global market access for local products sourced from the BOP (Sodhi and Tang, 2011) Issues with sharing and appropriating the value created between lead firms, small enterprises, micro-entrepreneurs (Sodhi and Tang, 2016)

Table V.
Implications for global supply chains – benefits, risks and social impact implications from the perspective of MNEs

competencies of MNEs and local embeddedness of these supply chains. In this manner, MNEs can create and promote inclusive global value chains by upgrading economically, socially and environmentally lower-level firms in the supply chains (Gereffi and Lee, 2012). Scenario 2, where MNEs partner with MSMEs which indirectly engage BOP actors, can also present significant social impact opportunities. Yet, as the chain of intermediation becomes longer, issues of direct control and accountability can present challenges for social impact (Parmigiani *et al.*, 2011).

Theoretical contributions and conclusion

This study aims to answer the following research question:

- RQ1.* Which mechanisms of supply chain inclusion are employed empirically by MSMEs, and how can these mechanisms influence social impact creation in MNE-led global supply chains?

The empirical results and literature investigation suggest that MSMEs engage in either direct or indirect inclusion. The proposed distinction confirms and extends current studies that argue that collaboration with cross-sector partners can be sufficient to bring products and services to BOP markets (Nahi, 2016; Hahn and Gold, 2014). The perspective of local supply chain inclusion in MSMEs extends the proposed classification of agency- and corporate-driven supply chains of MNEs by Parmigiani and Rivera-Santos (2015) by unraveling how inclusion of marginalized actors can materialize in local supply chains.

The findings suggest that MSMEs need to make important decisions with essential implications for SCM to include marginalized actors: direct or indirect inclusion mechanisms and tactics for handling complexity in diverse partnership networks. With this, the study contributes a more fine-grained understanding of the inclusion of marginalized actors in local supply chains (the latter being frequently ignored by current studies in favor of global supply chain issues). Furthermore, it is proposed that MSMEs can serve as brokers between local BOP markets and global MNEs. In this sense, the study extends the perspective of Sodhi and Tang (2011), who propose that small enterprises can support local supply chains in BOP markets. MNEs can further strengthen local supply chains by tapping into BOP markets through these MSMEs and thereby connecting global and local supply chains. By proposing alternative trajectories for local-global supply chain inclusion and by discussing the associated implications for social impact creation, the study at hand extends the debate on global supply chains in informal markets.

The exploratory insights from this study can enable theory development and testing in new settings. In order to further understand how MNEs choose to structure their global supply chain activities, manage the integration of BOP actors and select the appropriate partnership configurations, the theory of intermediation can be employed (Spulber, 1999). It can elucidate how MNEs decide whether integration of BOP actors will be done internally or externally, depending on the capabilities of selected partners (intermediaries), buyers and sellers with the goal to minimize transaction costs (Kistruck *et al.*, 2013). BOP settings provide a fertile ground for theory extension and refinement to account for social aspects as additional goals and constraints for social supply chain structuring decisions.

The empirical findings provide implications and research impulses for the debate on the necessity, the feasibility, and the antecedents of supply chain inclusion of marginalized actors in BOP markets. The empirical findings confirm the distinction between the single vs the multiple activities type of inclusion suggested by the literature (Nahi, 2016). In particular, studies adopting the perspective of global supply chains often focus on inclusion in particular activities, e.g. distribution, sourcing (see Gold *et al.*, 2013; Hall and Matos, 2010). The findings suggest that some (but not all) MSMEs tend to include BOP at all stages of their operations, and are thus truly inclusive. This may mean that for MNEs, supply chain inclusion is “a means to an end,” while for some MSMEs, it is “the end.” From the perspective of MNEs, close partnerships with this type of MSMEs for whom inclusivity is “the end,” would enable synergistic combinations of interests and resources.

While current work suggests that value chain inclusion may be needed to drive social impact and is not necessary for economic performance (e.g. Nahi, 2016), and the relationship between value chain inclusion and economic performance in BOP is more complex when considered with different time horizons. While in the short run, it may be more economically viable to engage in BOP markets through local stakeholders, in the long run, the social relationship developed between the enterprises and the local BOP may be an important driver of economic performance. This may be because a firm-driven value chain can enable the development of local relationships, and current research shows that in informal markets, social relationships are essential and can influence buying patterns (London *et al.*, 2014).

The insights from this study confirm previous literature findings that the supply chain inclusion of marginalized actors requires a collaborative mindset (Rivera-Santos and Rufin, 2010).

Regardless of the inclusion mechanism employed, the enterprises in this sample seem to collaborate closely with both business and non-business partners and develop wide and diverse stakeholder networks (Yunus *et al.*, 2010). This seems plausible, given previous insights suggesting that there are severe power and knowledge asymmetries between farmers and supply chain members, distrust toward MNEs, and a lack of understanding of local technical and business knowledge (Hall and Matos, 2010).

The findings reveal that in contrast to traditional supply chains, where the focus is on physical flows and economic concerns (Bals and Tate, 2017), in the BOP context, managing diverse logics and modus operandi is a key aspect. While traditional supply chains tend to be inclusive in terms of various suppliers, BOP supply chains tend to include non-business partners. Companies need to work together with local non-business partners in order to gain a “license to operate” in informal markets, where governance is often based on social norms, religious beliefs, language and local structures (De Soto, 2000). The question then arises: how does the diversity of members in the supply chain impact the creation of social impact for the BOP communities? This urgent question can be answered by drawing on traditional theories of resource dependency or structural holes (social network analysis) (Dyer *et al.*, 2008). Therefore, our empirical, problem-driven study points out that BOP context can be a suitable empirical context for theory development and refinement efforts, in particular resource-based view, relational view or social network analysis.

This study also entails several limitations that open up avenues for further research. First, all data for clustering variables and external variables have been collected through one survey and rather small sample. This methodological limitation may present biases in the data collection processes. In order to account for limitations inherent to the data set, the interpretation of the clusters draws on insights from the literature. Further research can be conducted in the form of empirical studies, specific to certain regions or countries, in order to generalize our insights or explore in-depth different mechanisms of supply chain inclusion, their antecedents, processes and consequences for social impact.

Second, this study treats the entire BOP population as monolithic and ignores the heterogeneous nature of BOP across different contexts. Nevertheless, this study is valuable because it provides an avenue for segmenting the BOP market and relevant initiatives for further, targeted empirical studies. Further research can focus on particular groups of BOP markets to investigate the role of contextual factors, such as level of discrimination, economic exclusion and institutional environment. Moreover, studies of other groups of marginalized actors (e.g. women, disabled youth) can enable generalization of insights across different groups of marginalized actors.

Third, this study has not addressed directly and empirically the relationship between inclusion and social impact. Further research should investigate key questions such as how the inclusion enables social impact creation in the long-term and who benefits from the inclusion and how (George *et al.*, 2012). Furthermore, it is important to explore how different structures of global and local value chain configurations influence social impact creation. Understanding social impact and different inclusion mechanisms is important, because inclusion in BOP markets presents important exploitation risks, where companies can intensify social exclusion, marginalization and inequality (Zwick *et al.*, 2008). Further research should investigate whether there are differences between the levels of inclusiveness and the relationship between social impact and other types of sustainable impact, i.e. economic and environmental. The underlying tenet of inclusive innovation (and development) is the engagement of firms in social innovation activities “to connect disenfranchised individuals and communities with opportunities that foster social and economic growth” (George *et al.*, 2012, p. 662). Similarly, the inclusion of marginalized actors in supply chains can open up new avenues for research in emerging and developing economies with a focus on social innovation, responsibility and shared-value creation

between stakeholders (Lee and Tang, 2017). It can also set new industry trends and norms in managerial practice.

The findings provide several important implications for practice, society and policy. From a practice perspective, the study offers insights for MSMEs and MNEs. The study points out valuable mechanisms which MSMEs with limited resources and diverse supply chain partners can employ to effectively manage their supply chains. MSMEs need to make two important decisions to include BOP actors in their operations, namely selection of direct and indirect mechanisms as well as optimal diversity of supply chain partners. Both decisions can have important implications for supply chain complexity and social impact creation. For managers of MNEs, the study hints toward potential partnerships with synergistic effects which can support MNEs in their efforts to create opportunities and social impact for marginalized actors. For society in general and policy in particular, involvement of BOP actors and non-business actors, especially NGOs, can be assessed and supported in more nuanced ways. A better understanding of what kind of partnership is needed shows the way for implementing better support structures for a range of inclusion formats.

Notes

1. We adopt the definition of MSMEs from the European Union (2003) which defines MSMEs as enterprises with fewer than 250 employees.
2. Examples of such databases include IBA ventures, 2SCALE, SEED, Change Makers, Practitioners Hub for Inclusive Business, Siemens Stiftung, Ashden Awards, UNDP, Intelcap Impact Investment Network, USAID, UKAID, AEC Africa, Venture Capital for Africa, Sankalp Awards and Ventures, VC4A, etc. These platforms list and continuously update their websites with numerous BOP enterprises from around the world as part of different initiatives related to awards, showcasing of best practices and innovations, marketing and investment match-making.
3. For each instrument adopted/inspired from the literature, an exploratory factor analysis (EFA) has been conducted in SPSS V23 following the guidelines of Field (2005) and obtained a good two-factor solution, consistent with the two instruments from the literature. There was one item from instrument B which loaded on both factors: "Consumers have a high level of participation in our value creation activities." Since, conceptually, there was indeed overlap between this item and the other items from instrument A, this item was removed.
4. The Jaccard similarity index (coefficient) is a measure of similarity between two samples (or data sets) and the values ranges between 0 and 100 percent. The percentages are easy to interpret: the larger the percentages, the more similar the two data sets are.
5. Gabriel's test is a *post hoc* test that uses the assumption of local homogeneity of variances. The procedure is also known to have greater power when sample sizes are unequal (Field, 2013).
6. Games–Howell is a *post hoc* test, where homogeneity of variances cannot be assumed, and it seems to offer the best performance (Field, 2013).
7. Levene's test of homogeneity of variances assesses the assumption that variances of the populations from which different samples are drawn are equal. In this study, this assumption needs to be tested in order to determine the selection of *post hoc* techniques.
8. Cramér's *V* index is a measure of association between two variables and it results in a value between 0 and 1, where a value closer to 1 translates into higher association.

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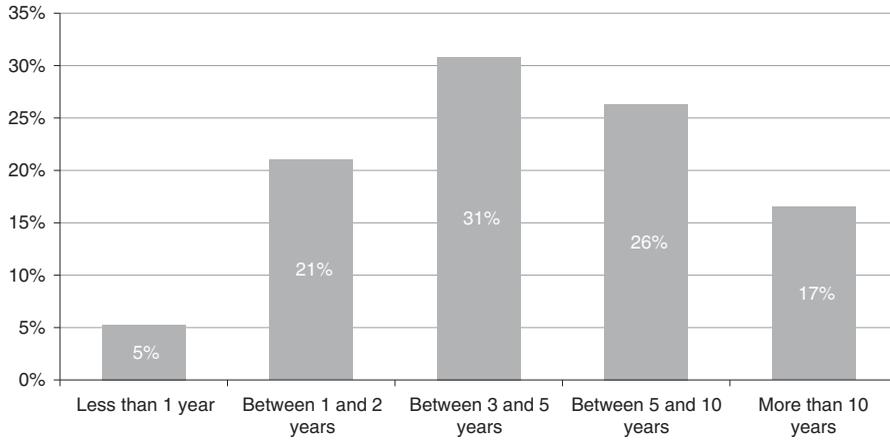
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Appendix 1. Descriptive statistics of the sample



Note: $n=134$ (in %)

Figure A1.
Age, in years

IJPDLM
49,5

596

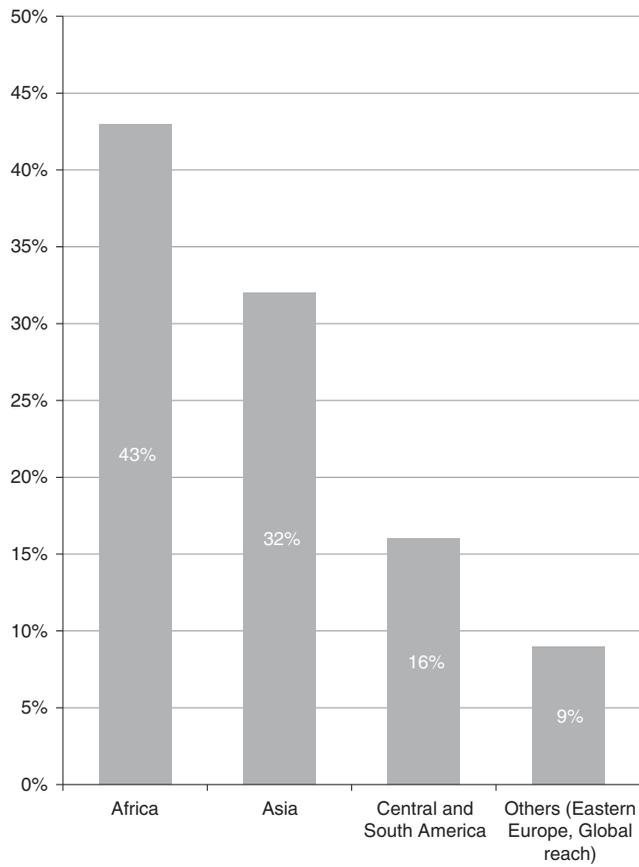
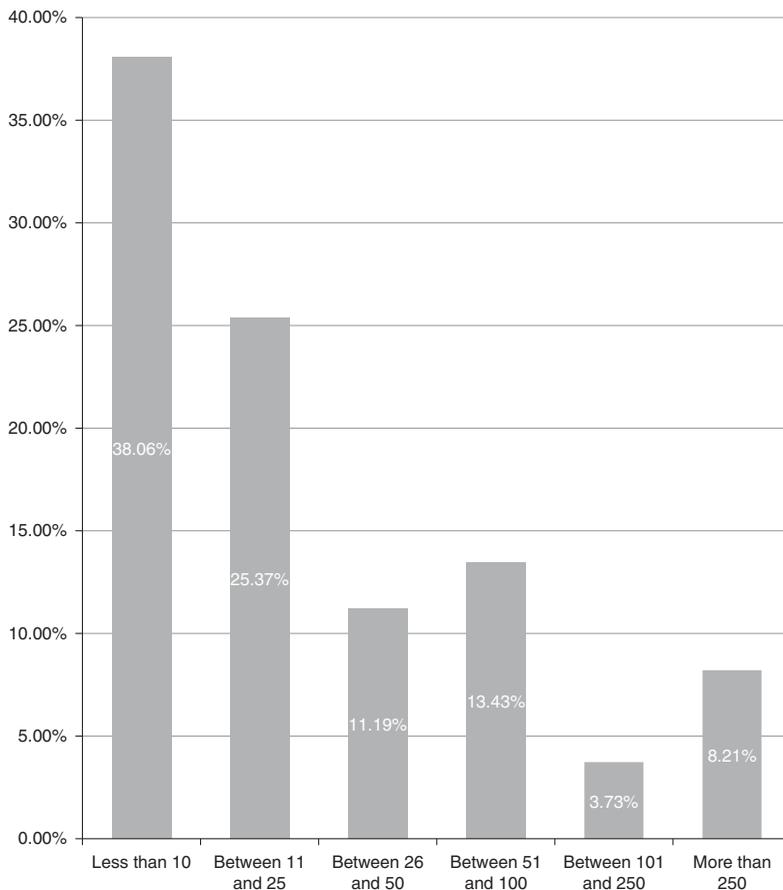


Figure A2.
Location of MSME

Note: $n=134$ (local branches) (in %)



Note: $n=134$ (in %)

Figure A3.
Size, as number of
employees

Appendix 2. Items used to operationalize behavioral and value chain inclusion

Items: A. Value chain inclusion, Cronbach's $\alpha = 0.785$

- A1: our enterprise performs joint product/service innovation with consumers (e.g. regular meetings, workshops);
- A2: our enterprise performs joint sourcing and raw materials acquisition with consumers (e.g. sourcing from local suppliers);
- A3: our enterprise performs joint product and service provision activities with consumers (e.g. local actors' employment);
- A4: our enterprise performs joint distribution, customer service and return activities with consumers (e.g. door-to-door deliveries); and
- A5: our enterprise performs joint promotional activities with consumers (e.g. local training).

Items: B. Behavioral inclusion, Cronbach's $\alpha = 0.874$

- B1: consumers spend a lot of time-sharing information about their needs and opinions with our employees;
- B2: consumers put a lot of effort into expressing their personal needs to our employees; and
- B3: consumers always provide suggestions to our employees for improving the products and services that we offer.

Appendix 3

ID/ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0.00														
2	4.79	0.00													
3	4.47	4.59	0.00												
4	4.83	5.18	5.80	0.00											
5	4.10	3.16	4.65	4.11	0.00										
6	1.95	4.75	4.39	3.72	4.29	0.00									
7	4.97	3.75	4.42	4.92	4.88	4.36	0.00								
8	5.82	3.82	4.99	7.98	5.54	6.41	5.23	0.00							
9	5.65	3.33	5.11	7.53	5.54	6.01	5.09	3.58	0.00						
10	3.72	3.00	4.66	6.26	4.18	4.30	3.92	3.09	3.75	0.00					
11	4.64	5.18	6.94	4.49	5.15	3.79	4.62	7.58	7.29	5.05	0.00				
12	5.90	4.55	5.53	7.36	5.14	6.33	6.25	4.44	4.16	4.82	8.05	0.00			
13	6.10	6.40	7.69	5.04	6.57	5.37	6.21	8.92	7.92	6.93	5.12	7.80	0.00		
14	4.27	5.30	4.24	6.42	5.13	5.15	5.14	4.57	5.61	4.56	7.47	5.46	8.13	0.00	
15	2.68	4.41	3.73	3.24	3.91	1.93	3.53	5.96	6.05	4.37	4.31	6.22	5.66	4.11	0.00

Table AI.
Distance matrix for
the first 15
observations

Note: A full version is available upon request

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