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Roles of Global Value Chains (GVCs) in Promoting Small and Medium-Sized Enterprises (SMEs) in Laos

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Abstract

This study attempts to address two principal research questions to tighten the development nexus of Global Value Chains (GVCs) and Small and Medium-sized enterprises (SMEs). First, how and when do GVCs promote local SMEs? Second, how can SMEs gain more from GVCs and move up to higher value-added activities? The findings show that firms' experiences in GVCs are very significant in explaining adjustments and improvements among SMEs. These positive changes are triggered by innovations and learning-by-exporting that enables them to acquire competitiveness and international standards. Innovations are imperative for local firms to gain competitiveness in the global market and to move up the ladder for higher value-adding activities. The results indicate that crucial factors for the local firms' innovation capacity improvement are local institutional support, training, increased incentive among workers (wages), firm size, technology transfer, and firm absorptive capacity.

Keywords: GVCs, SMEs, Innovation Capacity, and Laos

JEL: D24, F15, F23, L25, O31

1. Introduction and Motivation of Study

Global value chains (GVCs) include the full range of activities that firms use to bring a product from conception to final use and beyond. The activities include both tangible and intangible products, which are dispersed across geographic borders (Gereffi & Fernandez-Stark 2016; Kaplinsky & Morris 2001). Recently, GVCs, have been typically coordinated by multinational corporations (MNCs), foreign direct investment (FDI), and trade, which contribute positively to developing economies in terms of trade-led-growth, GDP growth, job creation, and Small and Medium Enterprise (SME) development (Abe 2015; Harvie & Charoenrat 2015; UNCTAD 2013; OECD 2008). There are enormous opportunities for SME participation namely, market access, knowledge spillover, technology upgrading, and innovation (WTO 2016). SMEs could access a new global market at a lower cost with a secured contract (OECD 2008). Furthermore, firms utilized their specialized technology and advantage to produce products or services as niche market targets (Abe 2015).

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The benefit from GVCs participation depends on the absorptive capacity of the local firms, the local business environment (Ohno 2013), and the type of GVCs (UNCTAD 2013). To maximize the benefit from GVCs presents several challenges for the local SMEs due to the high requirement from the lead firm and numerous players (Harvie & Charoenrat 2015). Moreover, SMEs have concerns about planning (Vaaland & Heide 2007) and the shortage of experienced management has induced few international activities (Yener, Dogruoglu, & Ergum 2014); consequently, SMEs can be easily taken over by competitive rivals.

To survive in an increasingly competitive business climate, SMEs require flexibility in production and know-how in business management. Convincing and raising awareness of SMEs to upgrade knowledge and skill acquisition, technology, innovation, and managerial business is essential. It is still vague and challenging for many developing countries, especially Lao SMEs (Small enterprises ' ≤ 19 persons'; Medium enterprises ' ≤ 99 persons'; Prime Minister's Decree No. 42/PM, dated 20 April 2004), which requires practical policies. Since Laos became a member of ASEAN in 1997 and the WTO in 2013, the openness index remains unchanged. Exports rely mainly on the mining and hydropower sectors that contribute to short-term employment creation and generate little to government revenue (WB 2017). Although SMEs dominate 99.75% of business entities in Laos (Lao Statistic Bureau-LSB 2015) and create more than 82% of employment, several constraints exist namely, low-skilled workers, and lack of innovation and supportive policy (UN 2015). Furthermore, only 12.10% of Lao businesses accessed finance, and only 10.05% used information and technology (IT). Consequently, manufacturing represented only 12.5% out of total business and less than 2% of Lao businesses served products and services to the global market – 0.51% of firms performed as exporters and 1.44% of firms supplied both domestic and overseas (LSB 2015).

To enhance the competitiveness of local SMEs, appraisal of the impact of GVCs on SMEs is vital before providing specific policies. Thus, this study aims to address two major questions to tighten the development nexus of GVCs and SMEs. First, how and when do GVCs promote local SMEs? This study aims to assess whether participating SMEs outperform relatively to non-participants. Since the Lao government has recently instituted economic-integration policy via local business partnerships with foreign entities in order to absorb technology, knowledge spillover, new market accession, and managerial advancements. Second, how can the local SMEs gain more from participation in GVCs, enhance competitiveness, and acquire higher value-added activities? SMEs should not only engage for market expansion but also maximize benefit to enhance competitiveness and stable growth. GVCs development theories are reviewed in this context with the goal to increase SMEs' benefit maximization and address policy concerns about new challenges.

In the next section, the literature review explores firm performance and GVCs along with enhancing SMEs' benefits from GVCs participation. Models and data sources are described in the third section followed by the results and discussion in the fourth section. Finally, conclusions and policy

recommendations associated with limitations of study are highlighted.

2. Literature Review

2.1. GVCs and SMEs

Participation in GVCs can increase SMEs' growth (Kim & Hemmert 2016; Musteen, Francis, & Datta 2010; Nazar & Saleem 2009) and small firms' growth (Brouthers & Nakos 2005). SMEs can gain from GVCs activities in several aspects namely, prestige from the lead firm, managerial advancements, technology spillover, resource allocation, efficiency improvement (the ability to produce with the least waste of inputs), productivity, and competitiveness. SMEs exploit learning processes drawing on knowledge spillover and stimulating personnel, innovation and technological upgrades (WTO 2016; Harvie & Charoenrat 2015).

Most firms that participate in GVCs in either direct or indirect forms have mostly observed positive impacts. For instance, Abe (2015) and WTO (2016) indicated that GVC-players performed better than non-GVC-players. Besides, participating SMEs are ensured greater stability than non-participants via better business diffusion and upgrading prospects (Navas-Aleman 2011). Prete, Giovannette, and Marvasi (2017) and Simona and Axele (2011) confirm that GVCs participation has a positive impact on productivity gains. Biesebroeck (2005) examined whether exporting product raised productivity -value added over total employees- of manufacturing in Sub-Saharan Africa. The finding indicated that exporters were more productive than domestic-oriented firms. In addition, Dikova, Jaklic, Burger, and Kuncic (2016) investigated diversified exports for Slovenian SMEs on productivity. They applied the value-added concept by the difference between total sales and production costs, shown that export is positively related to productivity. Baumann and Kritikos (2016) examined micro, small and medium-sized enterprises with large samples. This study suggested that innovation positively affected labor productivity. Whether better firm performance is a cause (learning-by-exporting) or an effect (self-selection) of GVCs participation remains debatable. For instance, learning-by-exporting was found in Indian firms (Haidar 2012) and African firms (Prete et al. 2017) while self-selection was found in Korean firms (Kim, Gopinath, & Kim 2009). However, experience in GVCs is expected to bring about greater productivity among SMEs in developing countries as it is shown in this study as a case of Lao SMEs.

There are several proxies to identify business performance. For instance, Karabulut (2015) described firm performance in four categories including finance, customers, internal business process, and growth and learning performance. Stam and Wennberg (2009) evaluated business performance by employee growth, while Hansen and Wernerfelt (1989) applied return on assets. O'Mahony and Vecchi (2009) used the growth rate of output, while Sleuwaegen and Goedhuys (2001) applied the average annual growth rate of employees and sales. This study, however, adopts a measurement of labor

productivity in order to distinguish business performance between participating and non-participating SMEs into GVCs.

2.2. Enhancing SMEs' Benefit from GVCs Participation

SMEs have great chance to gain more from GVCs participation by continuous improvement themselves in principal upgrade routes (Abe 2015; Humphrey & Schmitz 2002; Gereffi 1999). SMEs can consider appropriate options of GVCs upgrading, namely process upgrading, product upgrading, functional upgrading, chain upgrading, and market upgrading. GVCs upgrading refers to the explicit transformation from original equipment assembling (OEA) production with few value-added proportions under contract with a global buyer to original equipment manufacturer (OEM) by using a buyer's symbol. Then, firms attempt to own design manufacturer (ODM) by developing and designing the pattern of products directly to customers. Finally, firms constitute their own brand of so-called own brand manufacturing (OBM) and become the lead firm (Gereffi 1999).

Ohno (2013) and Ye et al. (2015) suggested that firms could gain more from GVCs by increasing productivity. However, one of the required factors to increase productivity and enhance competitiveness is innovation. To enhance the benefit maximization from GVCs participation requires local firms to improve innovation capacity to sustainable growth and competitiveness. According to theory, innovation is the pinnacle success tool in the global market with high competition for mapping opportunities that lie ahead (Rajapathirana & Hui 2018). Indeed, innovation increases productivity, employment growth, and sustainable business (Akcali & Sismanoglu 2015). Innovation has led to survival, growth, and SMEs development (Minniti & Venturini 2017), micro-firms (Baumann & Kritikos 2016), and SMEs competitiveness (Sipa, Gorzen-Mitka, & Skibinski 2015).

SMEs can increase innovation capacity by integrating trade, FDIs, and production networks (WB 2010). However, absorptive capacity to improve innovation capacity relies on business climate, firm capability, and government policy (Soltes & Gavurova 2014). Additionally, SMEs have lack linkage to reach activities and functional innovation system (e.g., institutions, policies, and tools). Thus, this suggests that external factors are very crucial for SMEs' innovation improvement. For instance, the technology-upgrading program enhances SMEs technical capacity; innovation, competitiveness, and growth (Guan, Mok, Yam, Chin, & Pun 2006) along with appropriate policies vitally transformed innovation capacity to innovation performance (Savru & Incekara 2015).

Many researchers have focused on innovation output-new markets, patents, and new products (Romijn & Albaladejo 2002), and degree of exports (Guo, Guo & Jiang 2016; Sun & Du 2015). In contrast, innovation capacity -the improvement of the overall firm capability to generate innovation for developing new products to meet market needs continuously (Szeto 2000)- has been generally overlooked. In order to fill this research gap, the significance of this study lies in its focus on innovation capacity on the part of local SMEs to explain the positive impacts of their participation in

GVCs. This study inquires how they can maximize the benefits of being on GVCs concerning their (quantified) innovation capacity rather than using variables that represent outputs of innovations or dummy variables for the existence of innovations. The potential factors that augment labor productivity and innovation capacity will be explored to draw policy implications. The factors to be tested are firm characteristics, firm capacity, and external factors (technology transfer, network, institute supports, etc.).

3. Models and Data

3.1. The Impact of GVCs on SMEs Performance

The empirical model is modified from Prete et al. (2017), Baumann and Kritikos (2016), Dikova et al. (2016), and Solow (1956). The total sales values per workers (labor productivity) are used to conduct empirical studies for a dependent variable.

$$Y_i = T_i K_i^\alpha L_i^{1-\alpha} e^{\varepsilon_i} \quad \text{EQ (1)}$$

K_i : Capital Input

L_i : Labor Input

T_i : Total Factor Productivity

$$T_i = f(\text{Innovation, export, GVCs participation, labor quality}) \quad \text{EQ (2)}$$

Where T is a function of components that may affect productivity, as well as some exogenous forces and i refers to a firm.

ε_i : The error term captures the effects of unknown factors, measures errors and other unobservable disturbances.

Dividing both sides by L_i in the equation (1), it can be rewritten:

$$\frac{Y_i}{L_i} = \left[\frac{K_i}{L_i} \right]^\alpha e^{\varepsilon_i} \quad \text{EQ (3)}$$

Taking the logarithm of both sides of the equation (3), the equation becomes:

$$\ln \left[\frac{Y_i}{L_i} \right] = \ln T_i + \alpha \ln \left[\frac{K_i}{L_i} \right] + \varepsilon_i \quad \text{EQ (4)}$$

The explicit equation is written into two equations below. Equation (5) focuses on GVCs participation by a dummy.

$$\begin{aligned} \ln PR_i = & \theta_0 + \theta_1 \ln CW_i + \theta_2 IFC_i + \theta_3 INC_i + \theta_4 DGVC_i + \theta_5 \ln FA_i + \theta_6 DJV_i + \theta_7 DSS_i \\ & + \theta_8 DSA_i + \theta_9 DAF_i + \theta_{10} DLC_i + \theta_{11} DLF_i + \varepsilon_i \end{aligned} \quad \text{EQ (5)}$$

Equation (6) elaborates more on GVCs experience and export intensity effect of SMEs productivity as written below:

$$\begin{aligned} \ln PR_i = & \theta_0 + \theta_1 \ln CW_i + \theta_2 IFC_i + \theta_3 INC_i + \theta_4 \ln EX_i + \theta_5 \ln GVC EX_i + \theta_6 \ln FA_i + \theta_7 DJV_i \\ & + \theta_8 DSS_i + \theta_9 DSA_i + \theta_{10} DAF_i + \theta_{11} DLC_i + \theta_{12} DLF_i + \varepsilon_i \end{aligned} \quad \text{EQ (6)}$$

Labor Productivity (lnPR): Firms with higher productivity are more competitive due to effective and efficient production through innovation, production networks, marketing, and procurement (Prete et al. 2017; Dikova et al. 2016; Baumann & Kritikos 2016; Roper & Arvanitis 2012; Biesebroeck 2005). Labor-productivity is derived from the total sales divided by total employment in the logarithm form as a proxy for firm performance.

Capital per Worker (lnCW): Current assets measure this (e.g., machinery, factory, vehicles, warehouses, etc.) divided by total employees in a logarithm (US\$). Given limitations in data collection, the study uses these reported (accounting book) values without any further adjustments. Higher ratio induces firms producing with the higher productive capital based on the growth model. This implies that labor can utilize production factors effectively leading to low product cost (Solow 1956).

Internal Firm Capacity (IFC): A combination of seven variables regarding the firm's human capacity consists of (1) skill intensity (proportion of employees with vocational school and above); (2) CEO and manager education level taking values from 1 to 4 ('1' = vocational and lower; '2' = bachelor; '3' = master; and '4' = Ph.D.); (3) CEO's and manager's age (years); and experience of CEO and manager working with MNC (years). Every variable is an important proxy individually and collectively to determine the internal firm capacity. However, as these variables tend to be correlated and linear, a standardized score (SS)¹ may be required to generate a single composite index, which fulfills the same purpose. A firm with higher human capital and knowledge accumulation brings about better business strategies and technological spillovers enhance a firm's competitiveness (Dijk 2002). This is assumed to have a positive correlation.

Innovation Capacity (INC): Higher innovation accelerates firms with higher productivity (Minniti & Venturini 2017; Baumann & Kritikos 2016) and ensures SMEs' competitiveness (Sipa et al. 2015). The degree of innovation capacity is determined through standardized score approach which combines three indicators namely, (1) share of R&D expenditure to total sales, (2) share of IT expenditure to total sales taking value from 0 to 4 ('0' = '0%'; '1' = '< 0.5%'; '2' = '0.5–0.99%'; '3' = '1–2%'; and '4' = '> 2%'); and (3) technology upgrading -purchasing new machines or improving existing ones within recent years- taking value from 0 to 4 ("0" refers to not improved or upgraded at all, and "4" refers to very

much improved or upgraded). INC is hypothesized to have a positive relationship with productivity.

Export Intensity (InEX): It refers to the share of export value to total sales as direct GVCs participation. The firm with higher export intensity has a more competitive cost of production bringing about higher productivity (Araujo & Salemo 2015; Ganotakis & Love 2012). Moreover, this proxy may differentiate direct GVCs participants (exporting firms) from indirect participants and non-participants in GVCs. Firms with greater export intensity are expected to have higher productivity relative to others.

GVCs Participation (DGVC): It refers to a firm engaging in GVCs takes a value of one; otherwise zero. The firm participating in GVCs is hypothesized to have higher productivity than non-participating firms (Prete et al. 2017; Simona & Axele 2011).

GVCs Experience (InGVCEX): It refers to the number of years that firms joined in GVCs (logarithm). It is hypothesized that longer firms might operate successfully by increasing productivity through utilizing technology transfer, knowledge spillover, and information accumulation and adapting themselves to international requirements (Haidar 2012; Prete et al. 2017).

Firm Age (InFA): It denotes the number of years of establishment in logarithm. The experience of doing business enhances management from learning-by-doing repeatedly (Liu 2017). Firms may utilize technological opportunities and get better techniques to manipulate market information, maintaining partners' relationships, and providing product and service to market with efficiency and flexibility.

Joint Venture (DJV): A local firm shared ownership with a foreigner(s) takes a value of one; otherwise zero, to assess the promotion policy on local firms and foreign firms partnership. Tsang (2002) suggested that firms in the form of joint ventures increase knowledge skill acquisition through learning-by-doing.

Finance Access (DAF): A firm could access financial institutions taking a value of one, otherwise zero. Finance access can create a chance to increase production capacity, business extension, and foreign market access. It enables firms to deal with business partners confidently to produce and supply extended order and secure international transaction.

Service (DSS) and Agriculture (DAS): To investigate whether there is any difference among sectors. DSS and DAS take a value of one for each, otherwise zero.

Location (DLC): A firm located in Vientiane capital takes a value of one, otherwise zero. It is assumed to have a positive impact on business performance due to accessible facilities and market information.

Large Firm (DLF): A firm with 100 workers plus takes a value of one, otherwise zero. It aims to reflect any difference between large firms and SMEs.

3.2. Enhancing SMEs' Benefit from GVCs Participation through Innovation

Based on GVCs theory outlined in the literature review section, it appears that important factors

enhance the local firm's benefit maximization from GVCs by increasing productivity through innovation capacity improvement. Innovation is one of a firm's strategies to ensure business expansion and profitability (Abdu & Jibir 2017) and innovation capacity should be promoted to bring about these innovations. The explicit equation is based on Sun and Du (2010); Szeto (2000); Romijn et al. (2002); and Romero (2012):

$$\begin{aligned}
 INC_i = & \theta_0 + \theta_1 DGVC_i + \theta_2 \ln L_i + \theta_3 \ln RC_i + \theta_4 \ln W_i + \theta_5 \ln SWT_i + \theta_6 LIS_i + \theta_7 TT_i \\
 & + \theta_8 IFC_i + \theta_9 DSM_i + \theta_{10} DSA_i + \theta_{11} DLC_i + \theta_{12} DJV_i + \varepsilon_i
 \end{aligned}
 \tag{7}$$

Where variables are explained in the next section, and ε_i is an error term.

Innovation Capacity (INC): It is measured the same as with Equation (6).

GVC Participation (DGVC): This refers to SMEs participating in GVCs as a form of a dummy variable. Production network is expected to encourage a local firm's innovation capacity improvement.

Firm Size: This refers to the number of total employees (**lnL**) and registered capital in US dollars (**lnRC**) in logarithm form to account for firm capacity in innovation investment. A larger firm is enabled to invest more in innovation capacity (Abdu & Jibir 2017; Romero & Martínez-Román 2012). It is assumed to have a positive relationship with INC.

Wages (lnW): This refers to an average wage in US dollars per year in logarithm form. Wages are determined by ability, education and worker skill (Robertson 2009). A firm paying higher wages is assumed to have laborers with high education, skill, and ability. Without appropriate innovation development coherence with worker capability, a firm may be less efficient. Average wages and new technology investment are hypothesized to move in a line.

Training (lnSWT): This refers to the share of employees trained to total employees a year in logarithm form. A firm with large employees trained will specialize in production. Hence, this requires firms to upgrade technology and production factors in parallel with their employee capacity. It is expected that training and innovation capacity are complementary.

Local Institutional Support (LIS): A firm, assisted by the government, education and business institutes, for instance, R&D, market information, training, product design, etc., should realize the importance of innovation and know-how to improve its innovation simultaneously. Radas, Anic, Tafro, and Wagner (2015) and Guo et al. (2016) asserted that public support schemes enhance the R&D-orientated, innovation output, and absorptive capacity of SMEs. Government and universities support stimulate patent acquisitions and new designs for SMEs (Doh & Kim 2014). LIS refers to the amount of assistance that a firm received taking a value from 0 to 7.

Technology Transfer (TT): This refers to a number of activities (R&D, share market information, training, and product design) that a firm conducts with its main suppliers and customers. This can accelerate them to improve their own innovation capacity (Guan et al. 2006). Partners might contribute

market intelligence and customer needs which influence potential firm's growth internationally through the science-business exchange -bridging education, training, and capacity building initiatives- (Brazinskas & Beinoravičius 2014). TT takes a value from 0 to 8 with an expected positive association with INC.

Internal Firm Capacity (IFC): This is measured the same with equation (6) as a proxy for human resources (Romijn & Albaladejo 2002). Level of education associated with previous experience was an essential predictor of innovation for small business (Romero & Martínez-Román 2012). The international experience of the outside CEO enhanced function and process upgrading strategies (Yeoh 2014). The higher absorptive capacity of firms resulted in well-structured and efficient innovation to overcome transaction complexity (Pietrobelli & Rabellotti 2011). It is expected to be complementary to a firm's innovation capacity (Koroglu & Eceral 2015).

Join venture (DJV): It is used the same as with EQ (6) with an expected positive relationship with innovation improvement.

Manufacturing (DMS) and Agriculture (DAS): Investigating whether there is any difference among sectors. DSM and DSA take a value of one for each, otherwise zero.

Location (DLC): A firm located in the Vientiane capital takes a value of one, otherwise zero. It is assumed to have a positive impact on innovation development due to having accessible facilities and market information.

3.3. Data Sources

To collect the data, the author commenced with a conceptual GVCs review based on Kaplinsky and Morris (2001). Then, the target group was classified by screening secondary data from Ministry of Industry and Commerce (MOIC) and stakeholders into two types. Type (1) denoted GVCs participating firms were divided into indirect and direct participants. The indirect participants referred to the firms having a connection with large firms (FDI, MNCs, and joint venture located at home, Laos) that affiliate with or operate as international businesses. After requesting and receiving the large firms' business partners' contacts, we screened for SMEs that formed as both part or component and service providers for the field-targeted survey. The direct participants referred to local exporting firms that were screened from the lists given. The type (2) referred to non-participants formed as the domestic-oriented market without connection with large firms as the type (1) by random selection. However, firms selected in type (2) shared similar characteristics to direct and indirect participants in term of firm size and business activity for comparison study.

A single survey format was developed that contained an explanation regarding GVCs participation. The initial survey was conducted in mid-2015 by author and colleagues (supported by MOIC); however, approximately 30% of the data was missing. Then, a second survey was conducted up in 2017 to account for the missing data. Data were collected in wide nation namely; Vientiane Capital

(27.41%), Luangpabang (37.04%), Savannakhet (23.70%) and Champasak (11.85%) provinces. 82.4% of the respondents were directors, managers, and owners. Some firms were able to interview immediately; others asked for leaving questionnaire form with them and returned later. In local provinces, most firms could be interviewed on the visiting day with assistance from the staff of Department of Industry and Commerce in the province.

A total of 135 samples consisted of services, manufacturing, trade, and agriculture. Service businesses accounted for 33.1%, including accommodations, tour agents, and logistic services. Manufacturing accounted for 32.7%, namely food and beverages, textiles and garments, furniture and others. Trade (retailer and wholesaler), agriculture product, and others accounted for 16%, 10%, and 8.2% respectively. 60% of firms participated in GVCs with a joint venture, and export firms accounted for 15.56%, and 11.85% respectively. 51.94% and 3% was small firms and large firms respectively.

4. Results and Discussion

4.1. Comparison of SMEs with- and without-Participation in GVCs

A number of proxies were selected to distinguish firm performance and characteristics between SMEs participating and non-participating in GVCs by applying the T-test for investigating the differences in sample means as shown in Table 1. It indicates SMEs involving in GVCs outperform in several aspects. First, firm size is significantly different between the two groups at the 1% level. The results also indicate that GVCs partners tend to select local firms with a certain size in the first place. Second, SMEs participating in GVCs have higher total sales and profit with consistent statistical

Table 1 Comparison of Firms Participating and Non-participating in GVCs

Variables	T-value	Variables	T-value
Registration capital	2.968 ^a	CEO's education level	2.360 ^b
Number of employees	4.565 ^a	CEO's field of study (business administration)	2.207 ^b
Current asset	3.096 ^a	The CEO's experiences in MNCs	2.317 ^b
Total sales	3.377 ^a	Manager employed	2.748 ^a
Annual profit	2.584 ^a	Internal firm capacity	2.937 ^a
Skill intensity	1.692 ^c	Quality of local institutions	-2.271 ^b
Average wages	0.467	Local institute support	2.543 ^b
Employees trained	1.924 ^c	Exchange activities with partners	1.890 ^c
Innovation capacity	1.805 ^c		

Note: a, b, and c superscript denote a significant level of 1%, 5%, and 10%, respectively. The number refers to T-value.

significance. It can be noted that SMEs participated in GVCs have higher human capital than non-participated firms such as CEO education, CEO experience working with MNCs, skill intensity, and employing managers.

Third, innovation capacity (INC) differentiates between two groups at the 10% significance level. According to data surveyed, SMEs participating in GVCs tend to invest in technology upgrading, accounting 62.96% of firms. Firms that received technical assistance from outside (R&D, marketing, training, technical assistance, information exchange, etc.) accounts for 45.93% of firms; out of that 72.22% are SMEs participating in GVCs. It should be noted that SMEs engaged in GVCs receive technical assistance, technological transfer, information exchange, and knowledge spillover from both local institute support and business partners outperform comparative to non-participated SMEs. Furthermore, SMEs with GVCs participation partake in activities to upgrade the worker's skill (employees trained).

Fourth, non-participating firms in GVCs seem to be concerned regarding behind-the-border regulatory issues comparing to participating firms. This indicates in quality of local institutions in particular lack of government assistance, high tariff, low efficiency of government, complicated import-export procedure, and unclear tax collection. This assumes that a higher number of impediments firm concerned presents the worse local institution performance and reduces a chance for GVCs participation. Unfortunately, the result indicates that there is no significant difference between the average wages of two groups. This might imply that SMEs in GVCs have not much-affected wages. However, all proxies described are still suspect whether SMEs participating in GVCs outperform a cause or an effect of engagement. Therefore, next section is required to confirm the suspects.

4.2. Firm's Performance after Participating in GVCs

In the initial field survey, signs of performance improvement observed among the SMEs 'after' participating in the GVCs were not assessed. Hence, the author followed up a field survey with 26 firms that participate in GVCs in Vientiane capital and Luangpabang (15th Sep–10th Oct 2017). The findings from this supplemental field survey should help us to identify the business performance aspects 'after' participation. As shown in Table 2 by a score of one to five, five mean the most improvement after joining GVCs. First, the results indicate that product quality is actively improving. Second, production capacity, productivity, sourcing, business environment, R&D, competitiveness, financial liquidity, and business expansion have also improved. The firms have tremendous opportunities for alternative procurement, business expansion, and R & D. This implies that SMEs participated in GVCs can improve not only net-output but also total sales. In this context, it is expected that the number of years they were on the GVCs matters, as experience count. However, firms seemingly create those chances from learning-by-doing. Of note, firms get moderate direct support from their partners and local institutes for business operations. Finally, there is little improvement

Table 2 Firm's Performance after Participation in GVCs

Contents	Score	Contents	Score
Product quality	4.27	Sustainable production and energy usage	3.42
Production capacity and technology upgrading	3.92	Market extension	3.38
Productivity	3.92	Networking	3.27
Procurement	3.88	Employees trained	3.27
Internal business environment	3.85	Finance access	3.23
R&D	3.85	Number of employees	3.08
External business environment	3.81	Local institute support	3.08
Competitiveness	3.72	Ease of finance access	2.88
Financial liquidity	3.69	Business partners support	2.77
Business expansion	3.54		

in sustainable production and energy use, market extension, networking, training employees, finance access, and employment growth. It is observable that finance access remains an obstacle, as only 20.14% of the total samples accessed financial institutes.

4.3. Empirical Results

4.3.1. The Impact of GVCs on SME Performance

Table 3 reports the regression results. The model (1) attempts to distinguish firm participation and non-participation in GVCs by regressing dummy variable (DGVC) on productivity. Then, DGVC is substituted by firms' experience in GVCs participation (lnGVCEX) shows the positive significance of productivity at the 1% level in the model (2). This provides a clue that local firms can gain from GVC participation, but it takes time. Focusing on the appropriate model specification is essential to respond to econometric assumptions namely, R^2 , log-likelihood, and Jarque-Bera-test. The higher R^2 and log-likelihood, the better the model performs. The model must be confirmed to adhere to a normal distribution by Jarque-Bera-test. Thus, model (2) is the specific model for interpretation based on the criteria selected.

First, the finding indicates that capital per worker is positive and statistically significant to explain productivity at the 1% level. This coheres with the Solow growth theory (capital deepening) that a firm with the effective capital utilized by workers operates productively. A 10% increase in that ratio stimulates productivity by 3.44%. Second, it is found that internal firm capacity (human capital) is a negative significance at 5% level. A 10% increase in IFC reduces productivity with a small change of 0.67%. It is noticed that the educational background of staff might not relate to real tasks

Table 3 Regression Result for Labor Productivity (LnPR), OLS Estimation (Obs. 135)

Symbol	Variable description	Model (1)		Model (2)	
		Coefficient	T-value	Coefficient	T-value
C	Intercept	4.3801 ^a	7.0743	4.4044 ^a	7.4590
LnCW	Capital per worker	0.3587 ^a	5.8340	0.3444 ^a	5.7558
IFC	Internal firm capacity	-0.0571 ^b	-2.0570	-0.0670 ^b	-2.4771
INC	Innovation capacity	0.0982 ^b	2.1254	0.0946 ^b	2.0640
LnEX	Export Intensity	-	-	0.1917 ^b	1.9864
DGVC	Dummy-GVCs participation	0.0905	0.5001	-	-
LnGVCEX	Firm experience in GVCs	-	-	0.1965 ^a	2.8422
LnFA	Firm age	0.1984 ^c	1.6667	0.1483	1.2592
DJV	Dummy-joint venture	-0.3219	-1.3835	-0.2679	-1.1994
DSA	Dummy-agriculture	0.6732 ^b	2.5008	0.5438 ^b	2.0391
DSS	Dummy-service	0.4303 ^b	2.1465	0.4209 ^b	2.1538
DAF	Dummy-finance access	-0.0295	-0.1360	0.0351	0.1659
DLC	Dummy-location	0.6061 ^a	2.8105	0.5856 ^a	2.7976
DLF	Dummy-large firm	-0.9766 ^b	-2.0490	-1.3605 ^a	-2.8315
R ²		0.3508		0.3936	
Log-likelihood		-181.389		-176.778	
Jarque-Bera-Statistic(P-value)		0.3137		0.9190	
Prob(F-statistic)		0.0000		0.0000	

Note: a, b and c subscript indicates a significance level of 1%, 5%, and 10%, respectively.

(production process). Specific training provided is required to accelerate productivity precisely through innovation improvement. Additionally, data showed that firms' CEO education background is not much related to their business activities. In contrast, CEOs in service sectors graduated mostly in business administration on the coherence of their business activities. In consequence, service sectors outperform relative to manufactures in term of productivity and innovation improvement (next section). This can be expressed that CEOs can contribute and share knowledge with their staff prosperously. Furthermore, a high skilled worker may not be treated different relative to the low-skill worker. As seen, the average wages are not significantly different between the two groups in Table 1, while other variables regarding internal firm capacity are significant at different levels. This suggests the SMEs should emphasize on organizational rearrangement, incentive measures, and working conditions.

Third, it is noteworthy that firms directly engaged in GVCs (exporters) are significant at the

5% level. 10% increase export intensity stimulates productivity by 1.92%. This implies that direct participants outperform relative to others. This suggests that a local firm can increase competitiveness by concentrating on learning-by-exporting for productivity improvement. Moreover, innovation capacity is statistically significant at the 5% level, consistent with theory and previous literature. A 10% increase in innovation capacity accelerates productivity by 1%. The critical variable confirms that GVCs experience (learning-by-doing) is statistically correlated with productivity at the 1% level. It improves productivity by 1.97% when time changes by 10%.

Finally, the results of control variables show that the large firm is negative significance either testing by increasing or constant return to scale in term of production function models. This indicates that the large firm is less productive relative to SMEs. Furthermore, the firms located in Vientiane capital seemingly have higher productivity than other areas due to accessible facilities and lower trade cost like technology, abundant labors, market access, good infrastructure, and ICT, etc.

4.3.2. Enhancing SMEs' Benefit from GVCs Participation by Promoting Innovation Capacity

Model (3) and (4) are tested to observe how innovation capacity (INC) relates to GVC participation as a dummy (DGVC) and GVCs experience. The results show that both of them are significant to explain INC at 10% and 5% respectively in Table 4. Then Model (5) includes DGVC in combination with other variables besides LnGVCEX. The finding elucidates that there is no difference for participants and non-participants regarding innovation improvement. This implies that initially, GVCs are not able to immediately accelerate firm's innovation in correspondence to productivity improvement in Equation (6). Therefore, it is assumed that firms can adapt themselves from learning-by-doing, and then GVCs experience is investigated instead of DGVC. However, GVCs experience seemingly moves consistently with the rates of employees trained, local institute support and technology transfer which represents the firms' benefits from participation shown in Table (1) and (2). Consequently, when those variables included in Model (6), GVCs experience becomes insignificance and negative sign in Model (7). Thus, the estimation strictly takes into account Model (8) by dropping GVCs dummy and GVCs experience, other main target variables are coherent. Equation (6) and (7) also confirms no presence of endogeneity after detection. The residual (INC) of Equation (7) of Model (8) is replaced in Equation (6) of Model (2) with Wald-test application.

The result reports that firm size (number of employees) is significant at the 1% level to encourage innovation improvement, but the registered capital is negatively significance at 10% level, first. This implies that a firm with a larger size tends to synergize on innovation improvement to overcome cost efficiency. In addition, a firm with large employees has various opportunities to exchange and share information on how to improve production along with deciding on innovation improvement. In contrast, firms started up with high capital-intensive invest less on innovation. Second, the result suggests that a firm with higher training and incentive (wage) tends complementarily to invest in innovation capacity

Table 4 Regression Results Determinant of Innovation Capacity (INC), OLS Estimation (Obs. 135)

Symbol	Variable description	Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
		Coe	T-value	Coe	T-value	Coe	T-value	Coe	T-value	Coe	T-value	Coe	T-value
C	Intercept	-0.3928	-1.4040	-0.4473 ^c	-1.8066	-5.4594 ^a	-2.7619	-1.2819 ^a	-5.3031	-5.4698 ^a	-2.6842	-5.2102 ^a	-2.6390
DGVC	Dummy-GVC	0.6546 ^c	1.8126			-0.4242	-1.3403						
LnGVCEX	Experience in GVCs			0.4205 ^b	2.5519			0.1947	1.3340	-0.0812	-0.5390	-	-
LnL	Number of labor					0.6982 ^a	4.3695			0.6534 ^a	4.1521	0.6350 ^a	4.1458
LnRA	Registered capital					-0.1651 ^c	-1.6588			-0.1711 ^c	-1.6789	-0.1836 ^c	-1.8566
LnW	Average wage					0.6356 ^a	2.6789			0.6440 ^b	2.6723	0.6258 ^a	2.6303
LnSWT	Employees trained					0.3153 ^a	3.0138	0.3274 ^a	3.2636	0.3025 ^a	2.8743	0.3062 ^a	2.9236
LJS	Local institute support					0.1926 ^a	2.9410	0.2135 ^a	3.1600	0.1889 ^a	2.8649	0.1860 ^a	2.8390
TT	Technology transfer					0.2195 ^b	2.4350	0.3009 ^a	3.2971	0.2247 ^b	2.4757	0.2242 ^b	2.4809
IFC	Internal firm capacity					0.1001 ^b	2.2917			0.1012 ^b	2.2879	0.0983 ^b	2.2463
DSM	Dummy-manufacturing					-0.2402	-0.7354			-0.2268	-0.6890	-0.2120	-0.6483
DSA	Dummy-agriculture					-0.7862 ^c	-1.8187			-0.7411 ^c	-1.7083	-0.7210 ^c	-1.6731
DLC	Dummy-location					-0.1639	-0.4017			-0.1682	-0.4059	-0.2020	-0.4946
DJV	Dummy-joint venture					0.2468	0.6508			0.1541	0.4121	0.1410	0.3789
	R-squared	0.0241		0.0467		0.4750		0.3190		0.4685		0.4673	
	Jarque-Bera-Statistic (P-value)	0.0000		0.0000		0.4025		0.0001		0.2734		0.2604	
	Prob. Chi-Square	0.0214		1.2275		20.625		12.0715		24.1495		23.558	
	Prob (F-statistic)	0.0722		0.0118		0.0000		0.0000		0.0000		0.0000	

Note: a, b and c subscript indicates a significance level of 1%, 5%, and 10%, respectively. "Coe" refers to the coefficient.

activities with a positive sign at the 1% level.

Third, external factors namely, local institute support and technology transfer from business partners are more significant relative to IFC at 1% and 5% respectively. This suggests that externalities are more influential than internal firm capacity (IFC) on local firms' innovation improvement. IFC also has a positive impact on innovation at the 5% level. This implies that a firm with higher human capital realizes how to increase competitiveness through innovation capacity investment. The results are consistent that SMEs have limited internal capacity to improve innovation by themselves.

Additionally, information, knowledge, and, technology diffusion from partners and local institute support have influenced innovation improvement. Based on data surveyed, firms receiving local institute support are firms participating in GVCs accounting for approximately 70%. Furthermore, firms received assistance from business partners, namely new product designing, granted patent, R&D support, and market analysis accounting for approximately 64% of firms participating in GVCs. Finally, the result shows that the service sector actively invests in innovation.

5. Conclusion and Policy Discussion

SMEs participating in GVCs outperform comparatively to non-participants in various aspects, for instance, human capital, innovation capacity, and business environment. SMEs that participated also received technical assistance from local institute and technology transfer from their business partners greater than non-participating SMEs. The firms after participating in GVCs confirm their improvement in several contents namely, product quality, production capacity, business environment, financial liquidity, and business expansion. They have tremendous opportunities for alternative sourcing, marketing, and innovation capacity development. However, opportunities are mainly from learning-by-doing and alertness with assistance from their business partners and local institutes.

In the regression analysis, although business performance (labor-productivity) suggests that a dummy variable (GVCs) cannot explain SMEs' performance, experience in GVCs is significant for SMEs' adjustment and improving themselves through innovation and learning-by-exporting for increasing competitiveness and international standards. Furthermore, capital per workers is highly significant for firm productivity, while human capacity has a negative relationship with productivity. This reminds entrepreneurs to be aware and scrutinize organizational arrangements. Holistically, innovation is one of the key factors to increase firm competitiveness in the global market through productivity and higher value-adding activities. The most influential factors determining innovation capacity consist of local institute support, training, incentives-wages, and firm size. Technology transfer from business partners also accelerates local firm innovation capacity improvements associated with a firm's capacity.

For faster Lao SMEs development, the government should intervene in local SMEs in GVCs participation's initial stage. Although the government has promoted local firm formation with global business partners as joint-venture type, it has not been practical yet to spur productivity and innovation. That requires the government to scrutinize what kind of business partners and investments significantly affect local firm development. Furthermore, as the literature cohering with these findings confirms, local institute support, training, incentive (wages), and technology transfer are essential for innovation improvement. The government should ensure effective programs executed and provide innovation knowledge and reachable information to SMEs. More than 54% of the total surveyed firms have not received any support from local institutes, and most of them are firms not participating in GVCs. Although the firms received support, they are not much satisfied. Simultaneously, local firms should be eager to climb up to higher value-added activities and diversities by emphasizing more on innovation and GVCs upgrading.

Although these are robust findings, the observations are limited. Future research should increase a number of observations and concentrate on how SMEs participate in GVCs and enhance for inclusive development.

Note

1 The standardized score is derived from the formula: $SS = \frac{\text{Actual-Group Mean}}{\text{Group standard Deviation}}$

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