Assessing the Development of Small and Medium Enterprises in Asian Countries: Index Based Approach

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ABSTRACT

Small and medium enterprises (SMEs) have been recognized as important to the economy in terms of their considerable contribution to GDP, employment generation, regional development and poverty reduction. The SME sector firms are less dynamic and underdeveloped as against large-scale enterprises in the Asian Countries. This creates the need of more efficient and professional government policies for SMEs to upgrade and strengthen this sector to meet the expectations of the countries in the region. In this study, the levels of SME development in Asian countries were measured under six core policy intervention areas; enabling environment, modern appropriate technology, culture and skills development, access to finance, market facilitation and infrastructure development, by developing six indices. Secondary data for SMEs in 32 Asian countries were collected from the World Banks' Enterprise Survey and indices were constructed using a multivariate technique; Principal Component Analysis. Results mainly highlighted that most of the developing nations showed satisfied levels in enabling environment and infrastructure development. Access to modern technology and finance were not satisfied while culture and skills development and market facilitation were critical in most of the Asian countries. On that account, the governments of developing nations in the Asian region should conceive better policies for SMEs to strengthen the culture and skills of employees, to uplift marketing and financing facilities and to provide knowledge on modern technology.

KEYWORDS: Indices, Principal Component Analysis, SME policies

INTRODUCTION

Small and medium enterprises (SMEs) have been recognized as important to the economy in terms of their considerable contribution to GDP, employment generation, regional development and poverty reduction. With the globalization trend, the SME sector is not merely seen as a sector for protection and promotion but, more importantly as driving force for growth and development (Anon, 2015). The SME sector is envisaged to contribute to transform lagging regions into emerging regions of prosperity. Therefore, enhancing national and international competitiveness is fundamentally important for this sector to face the emerging challenges and develop SMEs as a thriving sector.

Small and medium enterprises are perceived as the seedbed for indigenous entrepreneurship, and thus, must be nurtured to ensure they blossom into vibrant enterprises (Atawodi and Ojeka, 2012). Nations and governments all over the world, whether developed, developing or underdeveloped have continuously shown keen interest in entrepreneurship development. This is done through public policy. Public policy is an effective tool for business and economic planning. By public policy; it means the action of group in authority to implement their decision. These policies are attempts by the relevant actors in a political system to cope with and to transform their environment by deliberate measures which may involve the commitment of physical or symbolic resources (Dibie, 2000).

Government policies on development of SMEs and economic growth are positively related with each other. Therefore, policies to promote the development of SMEs are common in both developed and developing countries (Storey, 1994; Levitsky, 1996; Hallberg, 2000). In the case of developing economies, policies designed to assist SMEs have been an important aspect of industrial policy and multilateral aid programmes (Levitsky, 1996). The SME policy framework aims to improve business environment of SMEs by accessing to modern technology, developing skills, accessing to finance and market facilitation, allowing them to realize their full potentials in today's globalized economy.

Most of SME policies mention as their goal the achievement of higher rates of economic growth and the reduction of poverty (Ayyagari et al., 2007). However, they often have other objectives, such as employment, in addition to the above two mentioned. Additionally, when designing and implementing SME policies, policies are often faced with restrictions and incentives that go beyond concerns about market failures, and that

are more related to political cycles, equality, and other concepts in the realm of political economy (Ibarraran et al., 2009).

Firms in SME sector are less dynamic and underdeveloped as against large-scale enterprises in the Asian Countries. Weak linkages with external market, weak technological innovation, and limited SME financing have limited SMEs' growth. Lack of institutional support and policy inertia has further reduced the potential contribution of SMEs to the national economy. This creates the need of more efficient and professional government policies for SMEs to enhance their competitiveness. Development of SMEs under current SME policies in Asian countries has not been studied previously in comparison. In this study, the levels of SME development in Asian countries were measured under six core policy intervention areas; enabling environment, modern appropriate technology, culture and skills development, access to finance, market facilitation and infrastructure development, by developing six indices.

This study was carried out with the aim of providing comprehensive and effective monitoring tools to see whether the current policies, programs and institutions are supportive for the development of SMEs in the region. This will be helpful for the policy makers in Asian countries, to detect the areas that should be more focused when implementing future policies and programs for SME development.

METHODOLOGY
Theoretical Framework

The major areas of government policies on entrepreneurship development are enabling environment (EE), modern appropriate technology (MAT), culture and skills development (CSD), access to finance (AF), market facilitation (MF) and infrastructure development (ID). The critical objectives of public policies on SMEs and entrepreneurship development are: the emergence of millions of entrepreneurs and SMEs, favourable business environments, effective linkages of the various sectors and sub-sectors of the economy, global competitiveness and overall economic and technological advancement (Onuoha, 2010).

It was hypothesized that the government policies under these six policy dimensions are responsible for the development of SMEs in Asian countries. Therefore, this study explored the levels of SME development under six major policy dimensions by constructing six different indices using a multivariate technique called Principal Component Analysis.

Principal Component Analysis

Principal Component Analysis (PCA) is the general name for a technique which uses sophisticated underlying mathematical principles to transform a number of possibly correlated variables into a smaller number of variables called principal components (Richardson, 2009). The technique of PCA was first described by Karl Pearson in 1901. A description of practical computing methods came much later from Hotelling in 1933.

In PCA, each component is a linear weighted combination of the initial variables. For example, from a set of variables X_1 through to X_n,

$$PC_1 = a_{11}X_1 + a_{12}X_2 + ... + a_{1n}X_n$$
$$PC_2 = a_{21}X_1 + a_{22}X_2 + ... + a_{2n}X_n$$
$$...$$
$$PC_m = a_{m1}X_1 + a_{m2}X_2 + ... + a_{mn}X_n$$

Where, a_{mn} represents the weight for the mth principal component and the nth variable.

The weights for each principal component (PC) are given by the eigenvectors of the correlation matrix and the variance (λ) for each principal component is given by the eigenvalue of the corresponding eigenvector (Vyas and Kumaranayake, 2006). The first principal component accounts for the maximum possible proportion of the variance of the set of Xs, the second principal component accounts for the maximum of the remaining variance and so on until the last of the principal component absorbs all the remaining variance not accounted for by the preceding components.

Principal component analysis works best when variables are highly correlated but also when the distribution of variables varies across countries.

Indicator Selection

As a result of a comprehensive survey of literature and several focus group discussions, the study was able to identify 29 SME development indicators under six major policy intervention areas (Table 1).

Data Collection and Analysis

Secondary data were collected for 32 Asian countries from the World Bank's Enterprise Survey (enterprise.org) which provides homogeneous information for all the countries and also from the online databases maintained by the World Bank and the Asian Development Bank. Collected data were analyzed by Principal Component Analysis using Minitab 17 and the resultant principal components were used to construct six different indices

Table 1. Selected indicators under six major SME policy intervention areas

Policy Area	Indicators
EE	Cost of business start-up procedures Time required to start a business Senior management time spent in dealing with requirements of government regulation Percent of firms identifying tax rates as a major constraint Days to obtain operating license Days to obtain construction-related permit Days to obtain an import license
MAT	Percentage of firms using technology licensed from foreign companies Percentage of firms having its own website Percentage of firms using E-mail to communicate with clients/suppliers Percentage of firms with annual financial statement reviewed by external auditor
CSD	Percentage of firms offering formal training Percentage of skilled workers Years of the top manager's experience working in the firm's sector Percentage of firms with female participation in ownership Percentage of firms with a female top manager
AF	Percentage of firms with a bank loan/line of credit Percentage of firms with a checking or savings account Percentage of loans not requiring collaterals Percentage of firms not needing a loan
MF	Percent of firms with internationally-recognized quality certification Percentage of total sales that are exported directly Percentage of firms using material inputs and/or supplies of foreign origin
ID	Losses due to electrical outages Days to obtain an electrical connection Percentage of firms identifying electricity as a major constraint Number of water insufficiencies in a typical month Proportion of products lost due to breakage or spoilage during shipping to domestic markets Percentage of firms identifying transportation as a major constraint

EE – Enabling Environment, MAT – Modern Appropriate Technology, CSD – Culture and Skills Development, AF – Access to Finance, MF - Market Facilitation, ID – Infrastructure Development

Index Construction

The six indices namely; enabling environment index (EEI), modern appropriate technology index (MATI), culture and skills development index (CSDI), access to finance index (AFI), market facilitation index (MFI) and infrastructure development index (IDI) were constructed using the equation 1, with the use of principal components having λ greater than one.

$$I_i = \frac{PC_1\lambda_1 + PC_2\lambda_2 + ... + PC_n\lambda_n}{\lambda_1 + \lambda_2 + ... + \lambda_n} \quad (1)$$

Where,

I_i – Index score for i^{th} Asian country
PC_1, PC_2, PC_n – Principal Component values
$\lambda_1, \lambda_2, \lambda_n$ – Eigen values

Normalization

It was important to express all the six indices in a homogeneous and comparable way. Therefore each and every index score was expressed as a value between 0 and 100 by applying the following general formula:

$$Index\ value = \frac{I_i - Min}{Max - Min} \times 100 \quad (2)$$

Where,

I_i – Index score for i^{th} Asian country
Min – Minimum index score
Max – Maximum index score

According to this formula, the country with the lowest performance will get an index value of zero, the country with the best performance will get value of 100 while all other countries will have values reflecting their relative distance from the best and worst performer. But for EEI and IDI when lower the index value, the country was more developed. In this case, the index value was reversed to make the interpretation of the value the same as that of others using the formula:

$$Index\ value = 1 - \left(\frac{I_i - Min}{Max - Min} \right) \times 100 \quad (3)$$

With this approach all indices bear the same meaning: the higher the index value, the SME sector was more developed.

RESULTS AND DISCUSSION

Values for EEI, MATI, CSDI, AFI, MFI and IDI were obtained for all the 32 Asian countries to explore the levels of SME development under current SME policies comparatively (Table 2).

Table 2. Values of indices for small and medium enterprises in Asian countries

Economy	EEI (%)	MATI (%)	CSDI (%)	AFI (%)	MFI (%)	IDI (%)
Afghanistan	77.85	30.76	31.96	24.56	24.32	17.99
Armenia	86.52	67.07	17.49	70.81	17.36	91.50
Azerbaijan	84.29	51.79	37.47	37.92	23.74	100.00
Bangladesh	57.04	11.84	3.17	60.36	12.52	53.97
Bhutan	92.47	50.69	37.36	74.81	0.00	77.94
Cambodia	95.30	34.09	78.06	21.05	18.65	73.79
China	83.03	85.28	89.09	69.09	100.00	99.76
Georgia	85.11	54.54	25.20	62.24	3.83	74.55
India	88.19	70.78	30.99	52.63	48.32	80.77
Indonesia	90.61	0.00	19.47	39.32	15.39	87.49
Iraq	84.16	20.06	12.03	38.69	7.22	34.47
Israel	16.69	100.00	0.00	95.26	47.56	89.81
Kazakhstan	71.55	48.81	25.82	54.27	11.21	86.69
Korea, Rep.	58.76	66.38	11.38	86.41	30.10	92.16
Kyrgyz Republic	77.11	60.47	59.37	64.12	31.59	62.52
Lao PDR	87.61	29.22	38.78	57.77	28.44	81.56
Lebanon	53.88	89.04	34.85	93.93	21.14	47.63
Malaysia	80.14	46.91	56.42	100.00	79.17	85.23
Mongolia	65.04	70.21	62.60	78.12	24.61	78.39
Myanmar	88.03	14.31	24.31	0.00	8.58	72.34
Nepal	93.28	57.79	26.01	63.11	14.37	23.81
Pakistan	86.49	41.85	15.91	32.27	53.03	0.00
Philippines	91.89	80.80	32.49	77.68	24.93	80.13
Sri Lanka	78.18	39.39	8.09	77.86	22.50	75.06
Syrian Arab Republic	0.00	72.83	44.47	62.05	28.92	33.81
Tajikistan	86.29	49.17	30.82	36.34	19.91	68.65
Thailand	90.13	77.97	100.00	91.20	20.98	69.94
Timor-Leste	83.79	20.75	60.85	41.39	0.62	79.78
Turkey	82.78	76.37	18.85	87.11	65.36	88.70
Uzbekistan	85.48	34.35	18.30	54.60	7.28	89.72
Vietnam	82.36	48.76	45.33	78.89	17.79	90.70
Yemen, Rep.	100.00	22.22	20.48	23.53	11.73	0.13

EEI – Enabling Environment Index, MATI – Modern Appropriate Technology Index, CSDI – Culture and Skills Development Index, AFI – Access to Finance Index, MFI – Market Facilitation Index, IDI – Infrastructure Development Index

Yemen showed the highest value for EEI while Syrian Arab Republic showed the lowest value. Although both of them were developing nations in the Middle East Asia, they had contrasting levels of SME development under policies relevant to business enabling environment. Israel which is a developed nation in Asia scored the highest value for MATI while Indonesia showed the lowest value. Thailand, one of the developing nations in Asia acquired the highest value in CSDI and its lowest value was shown by Israel.

In case of AFI, Malaysia had the highest index value while Myanmar showed the lowest index value. Both of them were developing nations in East Asia but their policies imposed on access to finance created contrasting effects on SME development. China which is a developed nation in East Asia scored the highest value for MFI while Bhutan, a South Asian country resulted the lowest index value. Azerbaijan, a developing nation in Central Asia showed the highest value for IDI and its lowest value was acquired by Pakistan which belongs to South Asia.

Levels of satisfaction in development of SMEs under six major policy dimensions were identified based on the index values (Table 3).

Apart from the comparison between countries, results could be interpreted separately for each and every country. For an example; Sri Lanka had well satisfied levels of SME development under three policy intervention areas namely; enabling environment, access to finance and infrastructure development. It could be proved by higher index values obtained for EEI (78.18%), AFI (77.86%) and IDI (75.06%). Development of SMEs under policies relevant to modern technology was not satisfied as the value of MATI (39.39%) was quite low. Critical levels of SME development for Sri Lanka under market facilitation and culture and skills development were proved by very low index values obtained for MFI (22.5%) and CSDI (8.09%) respectively (Figure 1).

Table 3. Levels of development in small and medium enterprises

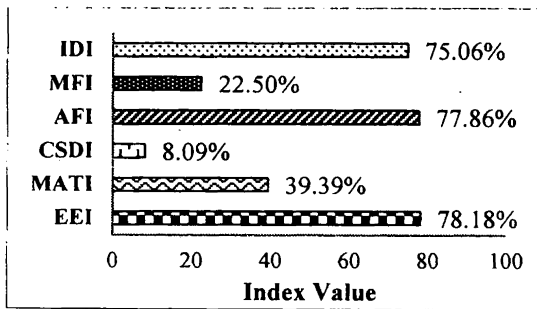| Index Range	Level of Satisfaction
0 - 25	Critical
25 - 50	Not satisfied
50 - 75	Satisfied
75 - 100	Well Satisfied

Figure 1. Index values for small and medium enterprises in Sri Lanka *Note: EEI – Enabling Environment Index, MATI – Modern Appropriate Technology Index, CSDI – Culture and Skills Development Index, AFI – Access to Finance Index, MFI – Market Facilitation Index, IDI – Infrastructure Development Index*

CONCLUSIONS

This study developed six indices to measure the development of SMEs in Asian countries. Those indices could be used as diagnostic tools to see whether the current policies, programs and institutions are supportive for the development of SMEs in the Asian region.

The findings of the study revealed that all the Asian countries showed satisfied or even beyond levels of SME development under the policies related to business environment, except Israel and Syria. Similarly most of the developing nations and three developed nations; Israel, Korea and China had satisfied levels of infrastructure development for SMEs. Knowledge on modern technology and access to finance are not satisfied in most of the developing nations. Market facilitation for SMEs is critical in all the Asian countries except in Turkey, Pakistan, Malaysia and China. Culture and skills development of SMEs is not satisfied or even critical in all the Asian countries except in Thailand, Mongolia, Malaysia, China and Cambodia.

On that account, the governments of developing nations in the Asian region should conceive better policies for SMEs to strengthen the culture and skills of employees, to uplift marketing and financing facilities and also to provide a better knowledge on modern technology. Conclusions can be made and recommendations can be given to each and every Asian country separately. For an example, Sri Lankan government and policy makers can recommend to put forward better SME policies to improve the skills of both male and female employees and to provide a better knowledge on modern technology, quality standards and international market.

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