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A COMPOSITE INDEX FOR THE MEASUREMENT OF ENTREPRENEURIAL SKILLS

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Abstract

This manuscript provides a composite index for measuring entrepreneurial skills in emerging business enterprises operating in South African townships in Gauteng Province, South Africa. The index is a result of data gathered from 432 emerging enterprises in Gauteng Province. The index is based on a matrix of indicators used by Worku (2018) for quantifying basic competence in entrepreneurship in the textile industry of Tshwane, South Africa. Skills in entrepreneurship were measured by using 5 dimensions. These were 3 items for the measurement of creativity, 12 items for taking reasonable risk, 15 items for ability in utilising business opportunities, 18 items for business leadership, 11 items for utilising assistance programmes that are made available to business enterprises. Seventy percent of entrepreneurs in the research possessed adequate entrepreneurial skills, whereas 30% did not. Regression analysis based on structural equations modelling identified 3 influential predictors of entrepreneurial skills (actual ownership of business enterprise, lengthy business operation period, and capability to use business intelligence methods for business decision making and the collection of market assessment).

Keywords: Gauteng Province, Entrepreneurial skills, Structural Equations Modelling

Purpose of research

The main aim of research was to quantify the level of entrepreneurial skills among a sample of 432 emerging business enterprises in Gauteng Province. The index is an expanded version of a matrix of indicators introduced in a textile-sector research carried out by Worku (2018) for the measurement of competence in entrepreneurship. Skills in entrepreneurship were measured by using 5 dimensions. These were 3 items for the measurement of creativity, 12 items for taking reasonable risk, 15 items for ability in utilising business opportunities, 18 items for business leadership, 11 items for utilising assistance programmes that are made available to business enterprises.

Results of study

Eight predictors of competence in entrepreneurship were identified by identifying pairs of significantly interdependent constructs (Ross, 2020). These 8 predictors are shown in Table 1 along with their corresponding probability values. All 8 predictors are significant at the 0.001 level.

Table 1: List of predictors identified from bivariate analyses (n=432)

Predictors associated with competency in basic entrepreneurship	**Observed chi-square value**	**P-value**
Ownership of business	31.3457	0.0000
Duration of business operation	27.4013	0.0000
Use of business intelligence	25.0526	0.0000
Knowledge of markets	22.1483	0.0000
Level of risk taken	20.6982	0.0000
Formal education	18.2416	0.0000
Investment goal	16.3510	0.0000
Age category of entrepreneur	12.3141	0.0000

Subsequent multivariate analysis was performed by using ordered logit regression analysis (Washington, Karlaftis,

Mannering & Anastasopoulos, 2020). Table 2 shows 3 influential predictors identified from ordered logit regression analysis.

Table 2: Three predictors identified from ordered logit analysis (n=432)

Determinants of satisfactory entrepreneurial skills	Odds Ratio	P-value	95% C. I.
Ownership of business	4.41	0.0000	(2.98, 5.85)
Long duration of business operation	3.77	0.0000	(2.34, 5.22)
Use of business intelligence	3.69	0.0000	(2.25, 5.13)

Structural Equations Modelling (Mueller and Hancock, 2019) was used for identifying key determinants of entrepreneurial competence. Structural equations modeling (SEM) is preferable to traditional regression models because it enables the researcher to ascertain the degree of reliability of the fitted model by using highly credible diagnostic procedures or goodness-of-fit tests. The method is commonly used in econometric and public health studies for estimating regression coefficients that are free from confounding or effect modifying variables. The method is highly suitable and convenient for estimating reliable regression coefficients by minimising measurement related errors and bias. The method is highly suitable for estimating unobserved or latent variables by using observed variables. The method is also highly valuable for assessing the degree to which an estimated regression model fits the data by using highly reliable goodness-of-fit statistical tests.

Based on findings reported in the literature by Marivate (2014), it was assumed that the level of entrepreneurial skills in emerging businesses in Gauteng Province is significantly influenced by 3 factors (Ownership of business, Long duration of business operation, and Knowledge of markets).

Chatfield and Collins (2018) have provided steps to be followed in structural equations modelling. According to the authors, confirmatory factor analysis (CFA) is highly valuable for finding out the number of groups and number of constructs per group required for assessing the model under hypothesis (hypothesised model). In this research, the model under hypothesis was constructed based on results obtained from ordered logit regression analysis. This exercise has led to the identification of 3 predictor variables. Ownership of business, Long duration of business operation, and Knowledge of markets).

Table 3: Percentage of variance explained by key predictor variables (n=432)

Determinants of satisfactory entrepreneurial	Number of factors retained	Coefficient of determination
Ownership of business	3	78.42%
Long duration of business operation	3	76.09%
Knowledge of markets	3	56.31%

Regression estimates obtained for the initial conceptual model are shown in Table 4.

Table 4: Structural equations estimates for initial conceptual model (n=432)

Predictor variable	Coefficient	Z-Statistic	P-value	OIM Std. Error
Ownership of business	3.28	6.27	0.0000	0.0117
Long duration of business operation	2.99	5.84	0.0001	0.0209
Knowledge of markets	0.36	0.72	0.1352	0.8248
Constant	2.48	4.47	0.0031	1.4916

Goodness-of-fit statistics obtained for the initial conceptual model indicated that the estimated model did not fit the data well. As a remedial action, an amendment was made to the initial conceptual model by substituting use of business intelligence for knowledge of market conditions. This remedial action yielded trustworthy estimates.

Table 5: Structural equations estimates for amended conceptual model (n=488)

Predictor variable	Coeffici ent	Z-Statistic	P-value	OIM Std. Error
Ownership of business	3.27	6.19	0.0000	0.0108
Long duration of business operation	2.96	5.79	0.0000	0.0114
Use of business intelligence	2.69	4.88	0.0000	0.0259
Constant	2.51	4.56	0.0027	1.1884

All goodness-of-fit statistics for the amended conceptual model are displayed and interpreted in Table 7 below. The statistics show that the amended conceptual model fits the data quite well. It follows that the amended conceptual model could be used for statistical inference.

Table 7: Goodness-of-fit statistics for amended conceptual model (n=488)

Diagnostic tests used for assessment and interpretation of goodness-of-fit statistics
AIC = 30.338 (Small enough) = Akaike Information Criterion = Measure of discrepancy between hypothesised and fitted model
BIC = 31.109 (Small enough) = Bayesian Information Criterion = Measure of discrepancy between hypothesised and fitted model
CFI = 0.97 (Larger than 0.95) = Comparative Fit Index = Percentage measure of reliability of fitted model
TLI = 0.97 (Larger than 0.95) = Tucker-Lewis Index = Percentage measure of reliability of fitted model
AGFI = 0.96 (Larger than 0.95) = Adjusted Goodness-of-fit Index = Percentage measure of reliability of fitted model
SRMSEA = 0.0228 (Less than 0.05) = Estimation error of fitted model
CD = 0.8014 (Larger than 0.75) = Coefficient of determination

Based on results estimated from structural equations modelling, the following three null hypotheses were accepted at the 0.001 level of significance.

H1: The adequacy of entrepreneurial skills (Y) is significantly associated with ownership of business enterprise (X1)

H2: The adequacy of entrepreneurial skills (Y) is significantly associated with a lengthy duration of business operation (X2)

H3: The adequacy of entrepreneurial skills (Y) is significantly associated with the utilisation of business intelligence (X3)

Figure 1 shows a conceptual framework corroborated by estimates obtained from structural equations modelling. These findings are consistent with findings reported in the literature about factors that affect competence in entrepreneurial skills among emerging entrepreneurs in South African townships by Marivate (2014), Fatoki (2014), Herrington (2018) and Worku (2018).

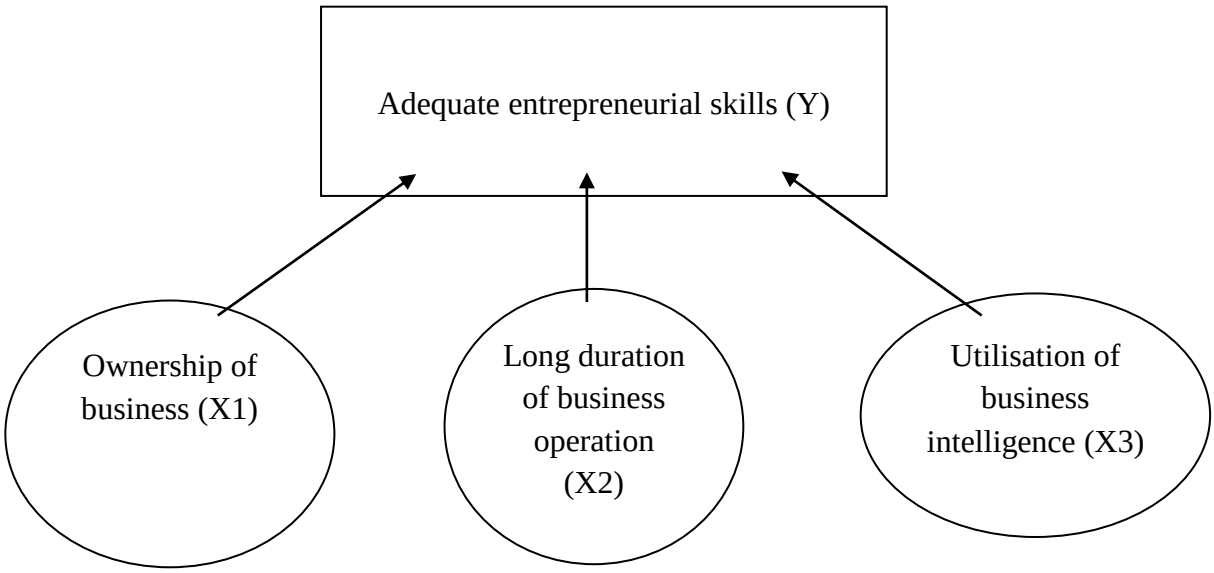

Figure 1: Conceptual framework corroborated by structural equations modelling

List of references

Aho, K., Derryberry, D., & Peterson, T. (2014). Model selection for ecologists: The worldviews of AIC and BIC. *Ecology*, 95(3), 631-636.

Almahry, F. F., Sarea, A. M., & Hamdan, A. M. (2018). A review paper on entrepreneurship education and entrepreneurs' skills. *Journal of Entrepreneurship Education*, 21(1), 1-7.

Bahoo, S., Alon, I., & Paltrinieri, A. (2020). Corruption in international business: A review and research agenda. International Business Review, 29(4), 1-13.

Blankesteijn, M., Bossink, B., & van der Sijde, P. (2021). Science-based entrepreneurship education as a means for university-industry technology transfer. *International Entrepreneurship and Management Journal*, 17(2), 779-808.

CEOWORLD. (2021). *World's Most Entrepreneurial Countries, 2021*. [Online]. Available from: https://ceoworld.biz/2021/01/03/worlds-most-entrepreneurial-countries-2021/ [Accessed: 29 Dec 2021].

Chatfield, C., & Collins, A. J. (2018). *Introduction to Multivariate Analysis*. New York: Routledge.

Chigbu, B. I., & Nekhwevha, F. H. (2021). The future of work and uncertain labour alternatives as we live through the industrial age of possible singularity: Evidence from South Africa. *Technology in Society*, 67(1), 1-11.

Dahlander, L., Gann, D. M., & Wallin, M. W. (2021). How open is innovation? A retrospective and ideas forward. *Research Policy*, 50(4), 1-11.

Dawson, H. J. (2021). "Making plans through people": The social embeddedness of informal entrepreneurship in urban South Africa. *Social Dynamics*, 1(1), 1-14.

De Crescenzo, V., Ribeiro-Soriano, D. E., & Covin, J. G. (2020). Exploring the viability of equity crowdfunding as a fundraising instrument: A configurational analysis of contingency factors that lead to crowdfunding success and failure. *Journal of Business Research*, 115(1), 348-356.

Fatoki, O. (2014). The causes of the failure of new small and medium enterprises in South Africa. *Mediterranean Journal of Social Sciences*, 5(20), 922-922.

Goolsbee, A., & Syverson, C. (2021). Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of Public Economics*, 193(1), 1-13.

Greenstone, M., Mas, A., & Nguyen, H. L. (2020). Do credit market shocks affect the real economy? Quasi-experimental evidence from the great recession and" normal" economic times. *American Economic Journal: Economic Policy*, 12(1), 200-225.

Gwiriri, L. C., Bennett, J., Mapiye, C., & Burbi, S. (2019). Unpacking the 'emergent farmer'concept in agrarian reform: Evidence from livestock farmers in South Africa. *Development and Change*, 50(6), 1664-1686.

Hahn, D., Minola, T., Bosio, G., & Cassia, L. (2020). The impact of entrepreneurship education on university students' entrepreneurial skills: A family embeddedness perspective. *Small Business Economics*, 55(1), 257-282.

Henderson, R. (2021). Innovation in the 21st century: Architectural change, purpose, and the challenges of our time. *Management Science*, 67(9), 5479-5488.

Herrington, M. (2018). *Global Entrepreneurship Monitor South Africa Report for 2016 to 2017*. [Online]. Available from: https://www.gemconsortium.org/report/49833 [Accessed: 29 Dec 2021].

Inanna, I., Rahmatullah, R., Haeruddin, M., & Marhawati, M. (2020). Silk weaving as a cultural heritage in the informal entrepreneurship education perspective. *Journal of Entrepreneurship Education*, 23(1), 1-11.

Israel-Fishelson, R., & Hershkovitz, A. (2021). Studying interrelations of computational thinking and creativity: A scoping review (2011–2020). *Computers & Education*, 176(1), 1-13.

Khambule, I. (2021). Capturing South Africa's developmental state: State-society relations and responses to state capture. Public Administration and Development, 41(4), 169-179.

Liguori, E., Muldoon, J., & Bendickson, J. (2020). Experiential entrepreneurship education via US films: why and how. *Journal of Small Business and Enterprise Development*, 27(6), 927-941.

Lyan, I. (2021). *"Start-up Nation" vs "the Republic of Samsung": Power and politics in the partner choice discourse in Israeli–Korean business collaboration*. [Online]. Available from: https://www.emerald.com/insight/publication/issn/1742-2043 [Accessed: 29 Dec 2021].

Madzivhandila, T. S., & Musara, M. (2020). Taking responsibility for entrepreneurship development in South Africa: The role of local municipalities. *Local Economy*, 35(3), 257-268.

Marivate, S. P. (2014). The impact of entrepreneurial skills on the viability and long-term survival of small businesses: a case of the City of Tshwane, South Africa. *European Journal of Business, Economics and Accountancy*, 2(2), 53-72.

Masondo, D. (2018). South African business nanny state: The case of the automotive industrial policy post-apartheid, 1995–2010. *Review of African Political Economy*, 45(156), 203-222.

Mueller, R. O., & Hancock, G. R. (2019). *Structural Equations Modelling*. New York: Routledge/Taylor & Francis Group.

Nhamo, L., Rwizi, L., Mpandeli, S., Botai, J., Magidi, J., Tazvinga, H. & Mabhaudhi, T. 2021. Urban nexus and transformative pathways towards a resilient Gauteng City-Region, South Africa. Cities, 116(1): 1-13.

Nthite, N., & Worku, Z. (2019). The perceived effects of location on the performance of SMMEs (Tshwane Townships). *International Journal of Economics, Business and Management Research*, 3(3), 95-106.

Ntshani, W. (2020). Assessment of entrepreneurial skills in small, micro and medium-sized business enterprises in the Vaal Triangle region of Gauteng Province. *International Journal of Applied Science Research*, 3(6), 235-259.

Olutuase, S. O., Brijlal, P., & Yan, B. (2020). Model for stimulating entrepreneurial skills through entrepreneurship education in an African context. *Journal of Small Business & Entrepreneurship*, 1(1), 1-21.

Polowczyk, J., Zaks, O., & Trapczynski, P. (2021). On the role of communication and management engagement for acquisition success: A study of Israeli startups. *International Entrepreneurship Review*, 7(4), 7-22.

Ross, S. M. (2020). *Introduction to probability and statistics for engineers and scientists*. New York: Academic Press.

Schroder, E., & Storm, S. (2020). *Fiscal policy in South Africa: Closed input-output income and employment multipliers.* Johannesburg: Institute for Economic Justice.

Schmulow, A. (2020). Consumer Financial Well-Being in South Africa's Twin Peaks Regulatory Regime: From Measurement, to Confidence in Outcomes. *The International Review of Financial Consumers*, 5(2), 11-18.

SERVICES SETA. 2021. *Annual report for 2019/2020*. [Online]. Available from: https://www.servicesseta.org.za [Accessed: 29 Dec 2021].

Small Enterprise Development Agency. (2020). Annual *report for 2018/2019*. [Online]. Available from: http://www.seda.org.za/ [Accessed: 29 Dec 2021].

South African National Department of Trade and Industry. (2020). *Annual report for 2018/2019*. [Online]. Available from: http://www.thedti.gov.za/ [Accessed: 29 Dec 2021].

South African Government Communication and Information System. (2004). *The National Small Business Act (Act no. 102 of 1996).* [Online]. Available from: https://www.gov.za/documents/national-small-business-act [Accessed: 29 Dec 2021].

South African Government Communication and Information System. (2008). *The South African Consumer Protection Act (Act no. 68 of 2008)*. [Online]. Available from: https://www.gov.za/documents/2008 [Accessed: 29 Dec 2021].

Statistics South Africa. (2021). *Mid-year population estimates 2020*. [Online]. Available from: http://www.statssa.gov.za/publications/P0302/P03022021.pdf [Accessed: 29 Dec 2021].

Tahoori, N., & Ghasemi, F. (2017). BMW Museum: A Symbol of German Contemporary High-Tech Architecture. *International Journal of Applied Arts Studies*, 2(4), 1-11.

Traore, Y., Muchie, M., & Worku, Z. (2020). South African ambitious investment objectives: The current foreign direct investment determinants in South Africa. *African Journal of Science, Technology, Innovation and Development*, 2(2), 1-18.

Washington, S., Karlaftis, M., Mannering, F., & Anastasopoulos, P. (2020). *Statistical and econometric methods for transportation data analysis*. London: Chapman and Hall/CRC.

Worku, Z. (2016). The impact of poor quality municipal services on small enterprises. *Investment Management & Financial Innovations*, 14(4), 274-279.

Worku, Y., & Muchie, M. (2020). Determinants of satisfactory performance in further education and training colleges in Gauteng Province. *African Journal of Science, Technology, Innovation and Development*, 2(2), 1-9.

Worku, Z. (2018). Factors that affect sustained profitability in the textile industry of Tshwane. *Journal of Applied Business Research*, 34(2), 295-308.