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DEVELOPING A TAXONOMY FOR IDENTIFYING ENTREPRENEURIAL RISK: AN EMPIRICAL STUDY ON ENTREPRENEURIAL RISK PATTERNS OF BUSINESS ENTERPRISES

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Most of the prior research on entrepreneurial risk concentrates on entrepreneur behavioral characteristics, personality traits and characteristics. Very little of the body of research examines the market behavior of the firm and its risk patterns that can cause business failure. The purpose of this research was to develop a taxonomy of entrepreneurial risk behaviors and examine their effect on small business enterprises (SME). The study was the development and administration of the Entrepreneurial Risk Survey (ERS) instrument. ERS was used to empirically examine a sample ($N = 201$) of SMEs across 11 industries for the proposed taxonomy of 22 risk variables. An exploratory factor analysis methodology was conducted for the study. The principle component analysis was conducted and resulted in an eight-factor solution. A multivariate regression analysis was also used to measure the industry type as a predictor variable. The results of the exploratory factor analysis (EFA) indicated there are eight factors of entrepreneurial risk that affect SMEs.

Keywords: Entrepreneurial risk; business taxonomy; factor analysis; PCA; commodity-type industries; risk patterns.

1. Introduction

One of the major problems in the pursuit of entrepreneurship is the issue of risk. Entrepreneurship is synonymous with risk. The rate of survival for the small business enterprise has been and continues to be significant, if not a challenging issue. By nature, all businesses are risky; one's capacity to assume those risks is the defining concept of entrepreneurship (Cantillon, 1732/2000; Kanbur, 1982). Economic factors appeared to have attributed to 30 to 50 percent of small business failures (Everett and Watson, 1998).

A significant number of the prior research on entrepreneurial risk has concentrated on two broad areas: risk aversion personality and risk-taking behavioral characteristics. Little research has been conducted in the area of entrepreneurial risk. Furthermore, very few studies support research on entrepreneurial risk. The limitation of the existing scholarly

literature and prior research principally focuses on entrepreneur personality and behavioral traits involving risk-taking and risk aversion behavior, rather than actual business enterprise assessment.

Despite the major contributions of the prior research on the risk-taking behaviors of entrepreneurs, there appears to be a dearth in the prior research. It is this gap in the research that provided the impetus for this research on entrepreneurial risk behavior on business enterprises. This study is a continuation of a prior study on entrepreneurial risk patterns and multivariate regression modeling with SMEs (Miles, 2011). The purpose of this study is to develop an empirical taxonomy of entrepreneurial risk patterns using an exploratory factor analysis methodology, thereby attempting to address this dearth in the research.

The paper is structured as follows. First, a review of the literature and prior research relevant to the study is presented. Next, Sec. 2 discusses the hypotheses proposed for the study. Section 3 describes the sample, variables and data collection and Sec. 4 presents the conceptual model of the study. Section 5 presents the results and the statistical analyses of the data. Section 6 presents the discussion of the results and the implications and directions for the research. Finally, the conclusion and summary are presented.

2. Theoretical Background and Literature Review

2.1. *Prior research on entrepreneur behavior and traits*

There is a dearth in the prior research that explicitly examined *entrepreneurial risk* in terms of enterprise risk assessment. A majority of the research singularly focuses on entrepreneur behavior in terms of risk. A significant majority of the prior studies focused on three areas: *risk tolerance and risk aversion behavior* (Barbosa *et al.*, 2007; Bhide, 1999; Businetz, 1999; Declich and Ventura, 2003; Rampini, 2004; Gilmore *et al.*, 2004; Xu and Ruef, 2004).

Other studies have examined *risk-taking personality behavior traits* of entrepreneurs (Kanbur, 1982; Iyigun and Owen, 1998; Diacon, 2002). Finally, other studies examined *risk behavioral traits* and *entrepreneur behavioral traits* (Davies *et al.*, 2002; Stewart *et al.*, 2003; Leyden and Link, 2004).

2.2. *Endogenous and exogenous risk factors*

The economics literature states there are two general subcategories within the concept of entrepreneurial risk: (a) *endogenous variables* are factors controlled within the firm such as price, advertising and operations (Hirschey and Pappas, 1992; Laming and Kuehl, 2007; McAuley, 1986) and (b) *exogenous variables* are factors outside the control of the firm such as consumer incomes, competitor prices and the weather (Hirschey and Pappas, 1992; McAuley, 1986; Miles and Darroch, 2006).

Many entrepreneurs are likely to start businesses in industries that are not the best for start-up ventures; they usually start businesses in the worst industries. Rather than start

businesses in industries with very few competitors, they tend to start businesses with a considerable number of competitors (Shane, 2008).

2.3. *Competition intensity*

This is the risk for an enterprise with intense competition: prices wars, nasty competitor behavior and thin profit margins (Gordon, 2007). Entrepreneurial risk is diminished if there are fewer competitors in terms of the market. The issue with market saturation and intense competition is a strong consideration in business venture risk. The risk of intense competition is apparent when there are a significantly high number of competitors in the market sector (McAuley, 1986; Porter, 1985, 1989; Hirschey and Pappas, 1992; Lambing and Kuehl, 2007; Miles and Darroch, 2006; Shane, 2008).

2.4. *Risk and business failure*

2.4.1. *Industry decline*

There are some critical studies on business failure and risk. Business failure is very apparent with industries in a state of decline in the product life cycle. Some business failure is also attributed to *industry decline*. Major characteristics of declining industries: (a) *technological substitution*, this can be threatening to industry profits because increasing substitution usually depresses profits at the same time as it cuts into sales; (b) *demographics*, this is shrinkage in the size of the customer group that purchases the product, thus the demographics cause the decline by reducing demand in downstream industries; and (c) *shifts in needs*, demand can fall because of sociological or other reasons, which change buyers' needs or tastes (Porter, 1989).

2.4.2. *Business failure*

Some failures are industry specific and may be more vulnerable to failure. Notably, a remarkably large percentage of people who begin the start-up process terminate it less than one year later (Shane, 2008). The typical entrepreneur forms a business that is gone within five years (Everett and Watson, 1998; Cressy, 2006). In the restaurant industry, there were marginal differences in restaurant failures between franchise chains (57.2%) and independent operators (61.4%). Restaurant density and ownership turnover were strongly correlated (Parsa *et al.*, 2005). Risk and business failure are significant factors in examining venture risk. *Economic factors* appear to be a contributing factor in 30 to 50 percent of small business failures such as lagging employment rates, interest rates and others (Everett and Watson, 1999). There are two key reasons to explain small business failure: (a) *poor management*, at least 90 percent of business failures were because of internal sources such as incompetence, neglect and a lack of experience; thus, poor preparation leads to failure and (b) *poor economy*, there was a heavy rate of small business failures accompanying the era of the Great Depression; the widespread belief is that an increase in business failures is indicative of a weakness in the economy (Yrle *et al.*, 2000).

2.4.3. *Financial vulnerability*

Sometimes business failure is because of financial vulnerability by the extent to which income and wealth are derived from the same source. Business owners face unique financial vulnerability because of their reliance on the business as both a source of income and wealth; farmers are the most vulnerable (Gutter and Saleem, 2005). Numerous studies have concluded financial vulnerability is a strong indicator of entrepreneurial failure (Fitzpatrick, 1931, 1932; Beaver, 1966; Altma, 1968; Bernstein, 1990; Rampini, 2004). Financial vulnerability with SMEs could be determined by the extent to which income and wealth are derived from the same source (Gutter and Saleem, 2005). Economic factors appeared to have attributed to 30 to 50 percent of small business failures (Everett and Watson, 1998; Heaton and Lucas, 2000).

2.5. *Entrepreneurial risk and risk variables*

Busenitz (1999) and Heaton and Lucas (2000) are both credited with coining the term "*entrepreneurial risk.*" However, Ahwireng-Obeng and Mokgohlwa (2002) are credited with defining *entrepreneurial risk* as "the risks associated with the success or failure of a business enterprise." They are also forerunners in developing taxonomy on entrepreneurial risk for enterprise and venture assessment. In their study, they examined entrepreneurial risk allocation with private and public infrastructure provisions in South Africa. They identified an entrepreneurial risk taxonomy: (a) *economic risk*, (b) *financial risk*, (c) *market risk*, (d) *technological risk*, (e) *develop and construct risk*, (f) *start-up and operating risk*, (g) *socio-political risk*, (h) *regulatory and legal risk* and (i) *force majeure* (natural disasters) risk.

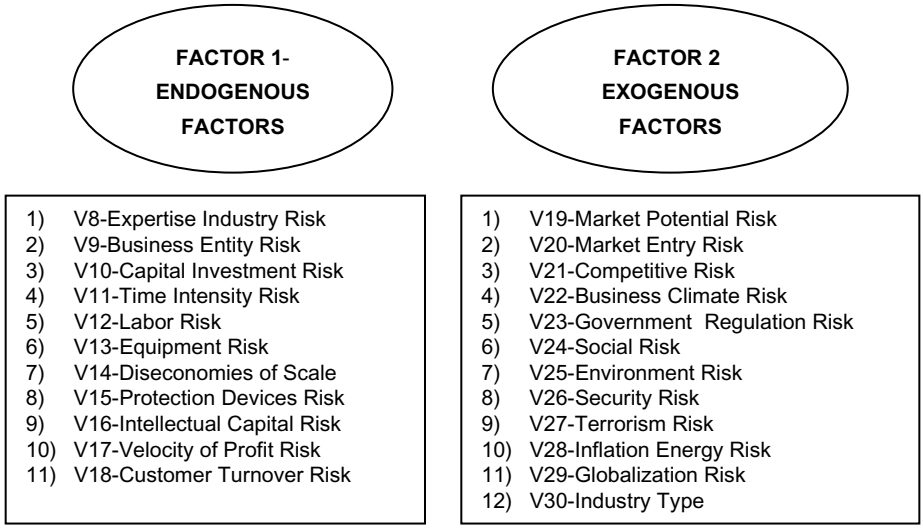

Fig. 1. Research model framework of study model.

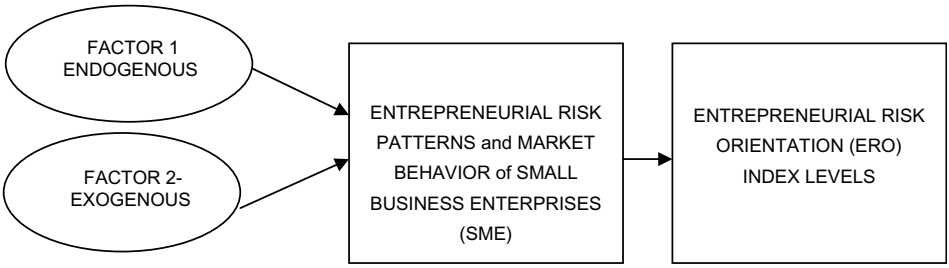

Fig. 2. Conceptual model of the study.

A central premise in the prior studies on entrepreneurial risk tends to focus on entrepreneur behavior, personality traits and behavior heuristics as opposed to firm behavior. What is largely missing from the literature on entrepreneurial risk is an exclusive focus on business enterprise risk as an assessment of firm behavior. The basis for this study is to further examine entrepreneurial risk and build on the prior research on entrepreneurial risk.

3. Methodology

3.1. *Research methodology*

The purpose of this study was to conduct an EFA and develop a taxonomy for entrepreneurial risk items and models. This was accomplished through development of the ERS instrument. The ERS instrument was designed to measure entrepreneurial risk patterns in SMEs and then administer the instrument to SMEs in different industry sectors. Subsequently, the researcher examined the underlying structure of the ERS using an EFA approach.

3.2. *Sampling and data collection*

The sampling frame was a list of SMEs in the local county. A total of 456 responses were collected from a randomly sampled population of 21,184 local SMEs. Also a convenience sample was used to collect additional data through social contacts. The rationale for focusing on SMEs was attributed to the fact the ERS instrument used for the survey was still in development and could not reasonably be used for larger business enterprises. Second, any business with 500 or less employees provided a good foundation for discriminating for the sampling frame. The criteria used for the sampling frame was determined by employee size (e.g. 1 to 499 employees). In this regard, a total of 255 were returned; however, only 201 usable surveys were collected. Many of the surveys were sent to old email addresses and non-current addresses. The final response rate was 26.8 percent ($N = 201$).

Data were collected by means of online surveys (SurveyMonkey.com), telephone interviews and in-person, paper surveys. The researcher sent out an email to the target population (SMEs) with a link to the survey instruments. Included in the email were: (a) a brief explanation of the study; (b) instructions for survey completion; and (c) the link to the survey instrument URL. The researcher was able to get the assistance and support from the

following agencies and organizations: Small Business Administration (SBA), Small Business Development Center (SBDC), Service Corps of Retired Executives (SCORE) and local chambers of commerce. The data was collected through Survey Monkey and subsequently exported into a Microsoft Excel spreadsheet.

3.3. *Measures*

The taxonomic analysis was conducted based on the ERS measurement instrument developed for measuring entrepreneurial risk constructs. The ERS instrument was developed from an extensive literature review of over 20 business books (accounting, entrepreneurship, finance, management, marketing, etc.) and 300 journal articles and developed prior to this study. The constructs were derived through exploratory factor analysis and tested for content, construct and criterion validity.

In developing the ERS instrument, the researcher was careful with each item. The survey items were carefully designed to ensure each ERS item measure different risk items developed from the literature (e.g., market saturation, market entry barriers, competitor intensity, etc.). The ERS instrument is a multi-dimensional measure that was developed based on the different scale properties. This was used to determine the extent to which respondents (SME owners) would identify risk scenarios described by each of the entrepreneurial risk types. This measure included 32 items; 22 of the variables used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) for examining risk patterns. The researcher decided the Likert Scale was most appropriate for this research because: (a) the likelihood of producing a highly reliable scale; and (b) the capability to measure more data. These strategies attempt to maximize accessing the highest number of participants through multiple data sources and multiple sites (Zikmund, 2003).

3.3.1. *Variable types used in the instrument*

The ERS instrument is comprised of three types of variable responses. The first variable type are *discrete variables*, which are data with a finite number of possible values (e.g., "1, 2, 3, 4, 5"; *strongly disagree* to *strongly agree*). The second type are *nominal/categorical variables*, which are data sorted into unordered categories (e.g., "industry type- agriculture, services or manufacturing"; "married, divorced or single"). Last, the variable type used are *dichotomous variables*, data with only two response options (e.g., "yes" and "no"; "male" or "female") (Allen and Yen, 1979; DeVellis, 1991; Dunn-Rankin *et al.*, 2004; Fowler, 1988, 1995; Kachigan, 1986).

3.3.2. *Entrepreneurial risk orientation (ERO)*

The rationale for using a researcher-developed instrument was because there was no existing instrument that met the needs of the study; nor the objective of measuring the risk behavior of business enterprises. The researcher had to develop an original questionnaire. The ERS consists of a multidimensional and 32-item scale to identify and predict market behavior and risk patterns in business enterprises. Table 1 presents the multi-dimensional properties of the ERS Instrument. The ERO index level is a composite of factors scores

Table 1. ERS Instrument Scale Properties and Classes.

Subscale Class	Number of Questions
Class 1: Two-item Scale Questions	3
Class 2: Three-item Scale Questions	2
Class 3: Five-item Likert Scale Questions (ER items)	22
Class 4: Five-item Multiple Choice Scale Questions	2
Class 5: Six-item Multiple Choice Scale Questions	3
Total items	32

that calculates for each of the dimensions (factors) by averaging respondents' answers across the items in each sub-dimension. The higher the ERO index level as a composite score to a particular sub-dimension, the more risky the business enterprise is [see Table 1].

First, after the initial development of ERS, it was reviewed by a panel of three subject matter experts in the fields of business, marketing, accounting, finance, entrepreneurship, management and research. The panel was asked to evaluate ERS and each survey item and make comments and recommendations. Second, the revisions to ERS were made on the basis of the panels' comments. After the panel made their recommendations, the instrument was redesigned and revised. Third, the instrument was pilot-tested on 30 SMEs. This was to examine the psychometric properties of the ERS instrument and make more revisions if needed. The analyses of the pilot-test were reviewed and more revisions were made in terms of question design and flow. Last, the instrument was administered to the target populations and the results were collected.

3.4. *Statistical research design and data analyses*

To compute and analyze the data collected for the study, three statistical methods were used: descriptive statistics, Principle Component Analysis (PCA) and multivariate regression analysis. SPSS 21.0 was used to compute the descriptive statistics (frequencies, means and standard deviations), Pearson correlation and multivariate analysis.

To further develop the taxonomy for this study, a two-step approach was employed. First, an exploratory factor analysis was conducted on the sample to develop a factor structure of the data. Second, after the factor structure was established, a multivariate regression analysis was used to test the factor structure using industry type as a predictor variable.

The goal of using a PCA is to extract variables from the data set with each component; it is used to reduce the number of variables under study; and the ranking and analysis of the variables. The PCA was used to establish *construct validity* and *content validity*; a multivariate regression was used to establish *criterion validity* (Kachigan, 1986; Brown, 1995; Grimm and Yarnold, 1995; Tabachnick and Fidell, 2007).

3.5. *Taxonomy approach/classification*

The taxonomy was constructed after the exploratory factor analysis was conducted. The eight factors extracted from the data were used to develop the taxonomy for the

entrepreneurial risk factors, respectively. The intercorrelation matrix of the factors is presented [see Table 4]. The factor coefficients that were below 0.30, (indicating multicollinearity) were not displayed and considered noteworthy. The taxonomy was developed from the factor structure and was also adopted to establish the *unidemensionality*. In addition, we conducted a multivariate regression analysis to assess multicollinearity, using industry type as a predictor variable.

As indicated in Table 4, the exploratory factor analysis suggested an eight-factor taxonomy structure. Factor 1 consists of five negotiation variables. This factor is collectively described as "*Industry/Economic Forces*." Factor 2 consists of three variables. This factor is described as "*Terrorism/Security Dynamics.*" Factor 3 consists of two variables. This factor is described as "*Government/Market Forces.*" Factor 4 consists of three variables described as "*Market Forces*." Factor 5 consists of three variables described as "*Global/Economic Forces*." Factor 6 consists of two variables described as "*Internal Forces*." Factor 7 consists of two variables described as "*Business Enterprise Intangibles*." Factor 8 consists of two variables described as "*Profit and Inflation Forces*." Having developed the taxonomy from the exploratory factor analysis, the taxonomy was established and confirmed [see Table 4].

3.6. *Industry type/classification*

A taxonomy was also developed for measuring industry types. The researcher wanted to take a different approach for examining industry types. Rather than measure the firms in the industries by the traditional Standard Industry Classification (SIC) or North American Industry Classification System (NAICS), the industries were measured by the number of competitors in the industry sector. Therefore, the industries were measured by their competition intensity. The rationale was to measure industry based on four categories rather than eleven categories (industry types).

This study measured four general industry category types: (a) *consumer-monopoly industries*, are businesses in industries that have little to no competition and tend to be monopolistic; (b) *consumer-competitive industries*, industries that have a few competitors but are not monopolistic; (c) *semi-commodity industries*, are businesses in industries that have a somewhat common product or service; tend to have a fair amount of competitors in the marketplace; and (d) *commodity-type industries*, are businesses in industries that have an excessive amount of competitors and price is the single most important consideration (Lowenstein, 1997; Buffett and Cunningham, 2001).

4. Results

This section presents the statistical analyses of the data and the results of the research questions investigated. The findings of both studies were organized into two sections. The first section illustrates the descriptive statistical findings and general data demographics. The second illustrates the inferential statistical findings in the data of both studies. Next, the paper focuses on the discussions of the results and the paper closes with conclusions of the research.

The researcher investigated the entrepreneurial risk patterns of SMEs. The participants (SME owners) were asked to complete the ERS instrument used for this study. As part of the study, the participants were asked to rate 22 risk variables on the survey. The statistics were calculated using a Statistical Analysis System (SPSS version 21.0). The data collected was entered into SPSS. Descriptive statistics are presented in Table 1. As indicated, the first column shows the variable; the second column shows the frequency and the third column shows the percentage of the sample.

4.1. *Descriptive statistics: Demographics*

Table 2 presents the descriptive statistics results of the sample. Data for this study were drawn from a prior study on SMEs (Miles, 2011). This study was taken from a sample of 21,184 SMEs. The ERS instrument also includes personal information on age, education level, time-length of business ownership, industry experience, and marital status. As

Table 2. Descriptive Statistics for Study of SMEs ($N = 201$).

Demographic Variables	*n*	%
Gender		
Male	66	32.8
Female	135	67.2
Marital Status		
Single (never been married)	28	14.0
Married	127	63.2
Divorced	30	15.0
Widowed	9	4.5
Separated	7	3.5
Age		
18 to 24	6	3.0
25 to 35	32	16.0
36 to 46	59	29.4
47 to 57	68	33.8
57 and over	36	18.0
Ethnicity		
Asian	2	1.0
Black/African American	54	27.0
Hispanic/Latino	73	36.3
Native American	4	2.0
White	62	30.8
Other	6	3.0
Time Length of Business Ownership		
Less than 1 year	84	41.8
1–3 years	39	19.4
4 years or more	78	38.8
Industry Type		
Consumer Monopoly-Type Industry	40	20.0
Consumer Competitive-Type Industry	39	19.4
Commodity Type-Industry/Product	92	45.8
Semi-Commodity-Type Industry	30	15.0
Total	201	100.0

Table 3. Results of Eigenvalues, Variance, and Cumulative Percent ($N = 201$).

Factors	Eigenvalues	% Variance	% Cumulative
Factor 1: Industry/Economic	2.944	13.381	13.381
Factor 2: Terrorism/Security	2.244	10.198	23.579
Factor 3: Government/Market	1.817	8.257	31.836
Factor 4: Market Forces	1.428	6.489	38.325
Factor 5: Global/Economic	1.367	6.215	44.540
Factor 6: Internal Forces	1.233	5.604	50.144
Factor 7: Business Enterp. Int.	1.136	5.162	55.306
Factor 8: Profit and Inflation	1.062	4.829	60.134

*_Note_: Extraction method: Principal Component Analysis (PCA)

indicated, the first column shows the variable; the second column shows the frequency and the third column shows the percentage of the sample. Table 2 provides the descriptive statistical information on the SMEs. Table 3 also presents data on the industry types (consumer monopoly, consumer competitive, semi-commodity and commodity-type) of the SMEs [Table 2].

4.2. *Results of the exploratory factor analysis*

The sample ($N = 201$) was used to conduct an exploratory factor analysis to examine the underlying factor structure of the ERS instrument and examine entrepreneurial risk patterns. The exploratory analysis conducted used a Principle Components Analysis with an oblique rotation. Using an eigenvalue-greater-than-1.0 criterion, an eight-factor solution emerged; the factor pattern and correlations between the factors are shown in Table 4.

First, Table 4 illustrates the eigenvalues (λ) are a statistic used in factor analysis to show how much variation in the group of variables is accounted for by a particular factor. The standard for an eigenvalue score is greater than 1.0 (Vogt, 1993). Eight factors with eigenvalues greater than 1 were extracted, which accounted for 60.13 percent of the variance in the 22 items tested. The number of factors retained was based on an examination of percentage of variance explained [Table 4].

To finalize the eight-factor model, numerous factor tests were conducted. The dimension content, the patterns of correlation were observed between the eight dimensions and the results of the exploratory factor analysis. The eight-factor model consisted of risk factors composing the following sets of dimensions: when oblique rotation was requested, factors interpreted as Factor 1: *Industry/Economic Forces* (0.732) to Factor 8: *Profit and Inflation Forces* (0.804) correlated 0.300 and above. Because the correlation was modest and limited to one pair of factors, and because remaining correlations were low, orthogonal rotation was chosen. Variables were ordered and grouped by size of loadings to facilitate interpretation. In summary, there were eight factors on the ERS for this group of SMEs.

Table 4 illustrates the factor coefficient loadings. The principal factors extraction methods with a varimax rotation were performed with SPSS 21.0 on 22 items from the ERS instrument for a sample of 201 SMEs. A principal component extraction (PCA) was used prior to principal factors extraction to estimate number of factors, presence of outliers,

Table 4. Factor Analysis Results of 22-Item and 8-Factor Solution Loadings ($N = 201$).

Factor Variables	Factors	Eigenvalues	% Variance
V13-Equipment Risk	0.732	2.99	13.4
V10-Capital Investment Risk	0.633		
V23-Government Reg. Risk	0.593		
V24-Social Risk	0.540		
V20-Market Entry Risk	0.419		
V27-Terrorism Risk	0.807	2.24	10.2
V26-Security Risk	0.801		
V25-Environment Risk	0.543		
V14-Diseconomies of Scale	0.776	1.81	1.42
V29-Globalization Risk	0.716		
V16-Intellectual Capital Risk	0.795	1.42	6.49
V11-Time Intensity Risk	0.541		
V18-Customer Turnover Risk	0.494		
V8-Expertise Industry Risk	0.797	1.37	6.21
V15-Protection Devices Risk	0.574		
V9-Business Entity Risk	0.557		
V17-Velocity of Profit Risk	0.741	1.23	5.60
V28-Inflation Energy Risk	0.459		
V21-Competitive Risk	0.689	1.14	5.16
V19-Market Potential Risk	−0.563		
V22-Business Climate Risk	0.804	1.06	4.83
V12-Labor Risk	−0.457		

absence of multicollinerarity and factorability of the correlation matrices. Eight factors were extracted. As indicated by the ERS, all factors were internally consistent and well defined by the variables; the lowest of the factors from variables was 0.419 [Table 4].

However, the reverse was not true; variables were by and large not well defined by this factor solution. With a cutoff of 0.300 for inclusion, variables under this benchmark were not used. Failure of numerous variables to load on a factor reflects heterogeneity of items on the ERS instrument.

4.3. *Examining the conclusive factor analysis structure*

The factor analyses results of the findings were presented. A revised conceptual model was developed as a result of the new conclusive factor structure (see Fig. 3). The revised conclusive factor structures model includes the new factors as a result of the exploratory factor analysis. The new revised conceptual model presents an 8-factor solution as shown in the previous exploratory factor analysis table. A critical observation can be made that the factor structure *significantly* differs from the exploratory conceptual theoretical model (see Fig. 1). The 22 items' configuration significantly differs with the theoretical model. A possible explanation that explains why some factors were more important than others is based on the number of factors and the coefficient amount. There are two main issues to

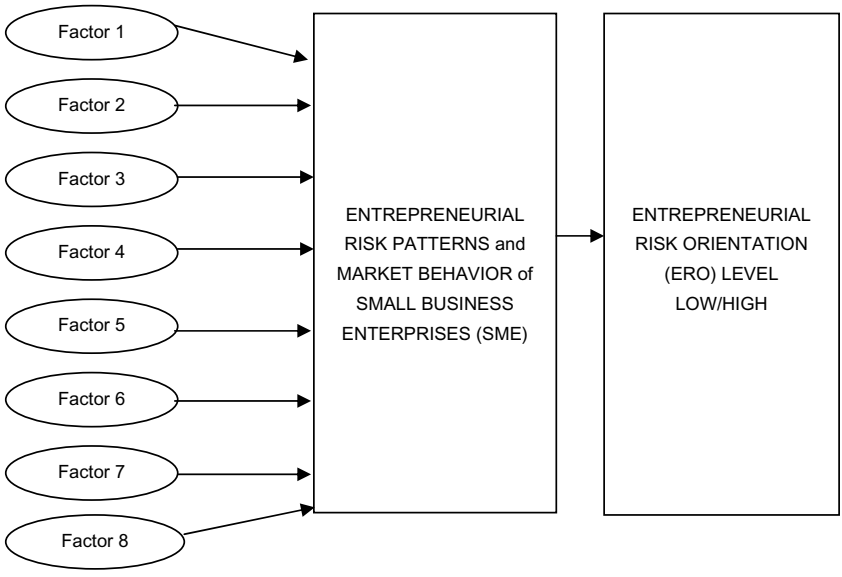

Fig. 3. Revised conceptual framework.

consider in examining the comparison between the theoretical model and factor loading findings. First, there is some structural agreement between the two. Second, the conclusive factor analysis confirms the appropriate factor loadings.

4.4. *Results of Pearson correlation of the factor loadings*

A Pearson correlation was conducted on the factors and latent variables as dependent variables. The dependent variables are ordinal rather than continuous variables. The correlations shown in Table 5 are suggestive of underlying relationships that warrant further study. There were no strong correlations in the data set between the risk variables and either the proportion of contributions overall. The correlation matrix provides no evidence of multicollinearity among the studied variables as the statistically significant correlations ($p < 0.01$) were within an acceptable range ($r = 0.17$ to $r = 0.39$). However, there were not many correlations between the factor variables [see Table 5].

4.5. *Results of multivariate regression analysis of industry types*

A multivariate regression analysis was used to test industry type as a predictor variable. As expected, the multivariate regression analysis results indicate some significance with some of the factor variables. Table 6 illustrates the results of the first multivariate regression analysis. First, a multivariate regression analysis test was used to measure industry type as a predictor variable to determine differences. The industry type was used as the independent variable and the factor variables were used as the dependent variables.

This test was conducted on the four industry types of the SMEs: (a) *consumer-monopoly industries*; (b) *consumer-competitive industries*; (c) *semi-commodity industries* and

Table 5. Results of Pearson Correlation on Factors and Latent Variables ($N = 201$).

Factors and Variables	1	2	3	4	5	6	7	8	9	10	11
FACTOR 1: *Industry and Eco.*											
1. V13-Equipment Risk	—										
2. V10-Capital Invest. Risk	0.348	—									
3. V23-Gov. Reg. Risk	0.333	0.091	—								
4. V24-Social Risk	0.200	0.295	0.253	—							
5. V20-Market Entry Risk	0.195	0.137	0.440	0.123	—						
FACTOR 2: *Terrorism/Sec.*											
6. V27-Terrorism Risk	0.022	−0.026	−0.032	0.125	0.126	—					
7. V26-Security Risk	0.132	0.056	0.164	0.218	0.091	0.436	—				
8. V25-Environment Risk	0.184	−0.072	0.137	0.164	0.138	0.329	0.320	—			
FACTOR 3: *Govt/Market*											
9. V14-Diseconom. of Scale	0.063	0.010	0.098	−0.024	0.183	0.170	0.176	0.212	—		
10. V29-Globalization Risk	0.039	0.082	0.078	0.108	0.252	0.021	0.063	0.230	0.357	—	
FACTOR 4: *Market Forces*											
11. V16-Intellect. Capital Rk	−0.013	−0.051	−0.016	0.029	0.069	0.160	0.087	0.087	0.104	0.026	—
12. V11-Time Intensity Risk	−0.132	−0.143	−0.057	−0.005	0.063	0.227	0.070	0.176	0.090	0.144	0.276
13. V18-Cust.Turnover Risk	−0.159	−0.286	−0.107	−0.126	−0.066	0.075	−0.107	0.034	−0.045	−0.056	0.205
FACTOR 5: *Global/Economic*											
14. V8-Expertise Indust. Risk	−0.024	−0.036	−0.009	0.153	−0.025	0.002	0.037	0.146	0.108	0.003	0.034
15. V15-Protect. Devices Rk	0.005	−0.170	−0.087	−0.028	−0.077	−0.013	0.078	0.203	0.124	0.081	0.298
16. V9-Business Entity Risk	0.011	−0.140	−0.020	0.005	−0.046	−0.080	0.089	0.077	−0.031	−0.013	0.045
FACTOR 6: *Internal Forces*											
17. V17-Velocity of Prf. Rk	−0.055	−0.002	0.097	0.125	0.141	0.079	−0.044	0.040	0.154	0.003	0.053
18. V28-Inflation Energy Rk	−0.033	0.082	0.093	0.203	0.217	0.175	0.154	0.100	0.286	0.164	−0.121
FACTOR 7: *Business Ent. Int.*											
19. V21-Competitive Risk	0.061	−0.080	0.194	−0.009	0.025	0.058	0.002	0.088	0.113	0.008	0.163
20. V19-Market Entry Risk	0.002	0.031	−0.084	0.063	−0.182	−0.168	−0.125	−0.051	−0.077	−0.038	−0.102
FACTOR 8: *Profit and Infl.*											
21. V22-Bus Climate Risk	−0.068	−0.114	0.087	0.106	−0.066	0.040	0.003	0.084	0.073	0.182	−0.016
22. V12-Labor Risk	0.249	0.126	9.125	0.055	0.249	0.175	0.233	0.117	0.281	0.095	0.259

Table 5. (*Continued*)

Factors and Variables	12	13	14	15	16	17	18	19	20	21	22
FACTOR 1: *Industry and Eco.*											
1. V13-Equipment Risk											
2. V10-Capital Invest. Risk											
3. V23-Gov. Reg. Risk											
4. V24-Social Risk											
5. V20-Market Entry Risk											
FACTOR 2: *Terrorism/Sec.*											
6. V27-Terrorism Risk											
7. V26-Security Risk											
8. V25-Environment Risk											
FACTOR 3: *Govt/Market*											
9. V14-Diseconom. of Scale											
10. V29-Globalization Risk											
FACTOR 4: *Market Forces*											
11. V16-Intellect. Capital Rk											
12. V11-Time Intensity Risk	—										
13. V18-Cust.Turnover Risk	0.178	—									
FACTOR 5: *Global/Economic*											
14. V8-Expertise Indust. Risk	0.119	−0.019	—								
15. V15-Protect. Devices Rk	0.201	−0.088	0.306	—							
16. V9-Business Entity Risk	0.017	−0.008	0.168	0.289	—						
FACTOR 6: *Internal Forces*											
17. V17-Velocity of Prf. Rk	0.028	0.187	−0.044	−0.218	−0.164	—					
18. V28-Inflation Energy Rk	0.014	−0.113	0.022	−0.095	−0.096	0.203	—				
FACTOR 7: *Business Ent. Int.*											
19. V21-Competitive Risk	0.129	0.076	−0.032	0.117	0.120	0.026	0.110	—			
20. V19-Market Entry Risk	−0.141	−0.139	0.023	0.039	0.045	−0.106	−0.034	−0.222	—		
FACTOR 8: *Profit and Infl.*											
21. V22-Bus Climate Risk	0.040	0.010	−0.073	0.135	0.033	−0.047	0.053	0.097	0.017	—	
22. V12-Labor Risk	0.003	0.010	−0.064	−0.050	−0.114	0.198	0.122	0.019	−0.111	−0.127	—

**Note*: All coefficients are significant at $p < 0.01$.

Table 6. Means and Standard Deviations of Industry Group as a Predictor Variable ($N = 201$).

Factors and Variables	Group 1		Group 2		Group 3		Group 4		
	Consumer Monopoly Industry ($n = 40$)		Consumer Competitive Industry ($n = 39$)		Semi-Commodity Industry ($n = 30$)		Commodity Type Industry ($n = 92$)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*p*
FACTOR 1: *Industry/Eco. Forces*									
• V13-Equipment Risk	2.45	1.085	2.69	1.080	2.37	0.890	2.70	1.202	0.396
• V10-Capital Investment Risk	1.60	1.194	1.64	1.038	1.37	0.850	1.45	0.976	0.592
• V23-Government Reg. Risk	1.95	1.239	2.72	1.432	2.40	1.102	2.76	1.470	**0.015
• V24-Social Risk	1.20	0.723	1.79	1.151	1.70	1.179	1.43	0.929	0.033
• V20-Market Entry Risk	3.12	1.522	3.51	1.355	3.07	1.112	3.29	1.449	0.523
Total	10.32	5.763	12.35	6.056	10.91	5.133	11.63	6.026	
FACTOR 2: *Terrorism/Sec. Dyn.*									
• V27-Terrorism Risk	2.05	1.280	2.92	1.645	2.17	1.117	2.55	1.378	**0.020
• V26-Security Risk	1.80	1.137	2.62	1.549	1.87	1.074	2.13	1.303	**0.028
• V25-Environment Risk	1.98	1.405	2.38	1.549	2.13	1.196	2.39	1.358	0.382
Total	5.83	3.822	7.92	4.743	6.17	3.387	7.07	4.039	
FACTOR 3: *Government/Market*									
• V14-Diseconomies of Scale	2.87	1.539	2.85	1.531	2.53	1.332	3.18	1.437	0.168
• V29-Globalization Risk	2.45	1.825	2.74	1.712	2.50	1.676	2.58	1.799	0.895
Total	5.32	3.364	5.59	3.243	5.03	3.008	5.76	3.236	
FACTOR 4: *Market Forces*									
• V16-Intellectual Capital Risk	3.40	1.751	3.79	1.689	3.90	1.242	4.10	1.445	0.120
• V11-Time Intensity Risk	2.45	1.616	2.95	1.638	2.90	1.494	3.11	1.661	0.206
• V18-Customer Turnover Risk	3.55	1.663	3.15	1.565	3.13	1.332	3.64	1.502	0.226
Total	9.40	5.030	9.89	4.892	9.93	4.068	10.85	4.608	
FACTOR 5: *Global/Economic*									
• V8-Expertise Industry Risk	2.65	1.424	3.15	1.663	3.37	1.712	2.76	1.557	0.151
• V15-Protection Devices Risk	2.58	1.678	2.90	1.729	3.83	1.315	3.14	1.733	**0.017
• V9-Business Entity Risk	3.32	1.760	3.21	1.760	3.53	1.525	3.65	1.586	0.479
Total	8.55	4.862	9.26	5.152	10.73	4.552	9.55	4.876	

Table 6. (*Continued*)

Factors and Variables	Group 1		Group 2		Group 3		Group 4		
	Consumer Monopoly Industry ($n = 40$)		Consumer Competitive Industry ($n = 39$)		Semi-Commodity Industry ($n = 30$)		Commodity Type Industry ($n = 92$)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*p*
FACTOR 6: *Internal Forces*									
• V17-Velocity of Profit Risk	2.48	1.724	3.05	1.806	2.60	1.453	2.77	1.773	0.488
• V28-Inflation Energy Risk	1.43	0.813	1.85	1.182	1.87	1.137	1.87	1.188	0.178
Total	3.91	2.537	4.90	2.988	4.47	2.59	4.64	2.961	
FACTOR 7: *Business Enterpr. Int.*									
• V21-Competitive Risk	1.47	0.913	2.38	1.187	3.45	1.234	4.86	0.350	**0.003
• V20-Market Entry Risk	1.98	1.527	1.62	1.206	2.27	1.507	1.29	0.819	**0.008
Total	3.45	2.440	4.00	2.393	5.72	2.741	6.15	1.169	
FACTOR 8: *Profit and Inflation*									
• V22-Business Climate Risk	1.92	0.917	2.10	0.912	2.20	0.925	2.22	0.947	0.402
• V12-Labor Risk	2.87	1.285	3.15	1.424	2.97	1.129	3.02	1.460	0.838
Total	4.79	2.202	5.25	2.336	5.17	2.054	5.24	2.407	
Total Factor Means and SDs	51.57	30.020	59.16	31.803	58.13	27.533	60.89	29.322	

**Note*: *$p < 0.05$, **$p > 0.01$.

Table 7. Multivariate Regression Using Industry Type as Independent Variable Effect ($N = 201$).

Factors and Variables	*SS*	*df*	Mean	*F*	R^2	ΔR^2	*p*
FACTOR 1: *Industry/Economic Forces*							
• V13-Equipment Risk	3.706	3	1.235	0.995	0.015	0.000	0.396
• V10-Capital Investment Risk	1.979	3	0.660	0.636	0.010	−0.005	0.592
• V23-Government Reg. Risk	20.234	3	6.745	3.594	0.052	0.037	**0.015
• V24-Social Risk	8.581	3	2.860	2.971	0.043	0.029	0.033
• V20-Market Entry Risk	4.431	3	1.477	0.752	0.011	−0.004	0.523
FACTOR 2: *Terrorism/Security Dynamics*							
• V27-Terrorism Risk	18.476	3	6.159	3.356	0.049	0.049	**0.020
• V26-Security Risk	15.602	3	5.201	3.109	0.045	0.045	**0.028
• V25-Environment Risk	5.907	3	1.969	1.027	0.015	0.015	0.382
FACTOR 3: *Government/Market Forces*							
• V14-Diseconomies of Scale	10.904	3	3.635	1.702	0.025	0.010	0.168
• V29-Globalization Risk	1.901	3	0.634	0.202	0.003	−0.012	0.895
FACTOR 4: *Market Forces*							
• V16-Intellectual Capital Risk	13.858	3	4.619	1.966	0.029	0.014	0.120
• V11-Time Intensity Risk	12.152	3	4.051	1.536	0.023	0.008	0.206
• V18-Customer Turnover Risk	10.194	3	3.398	1.463	0.022	0.007	0.226
FACTOR 5: *Global/Economic Forces*							
• V8-Expertise Industry Risk	13.321	3	4.440	1.786	0.026	0.012	0.151
• V15-Protection Devices Risk	28.868	3	9.623	3.467	0.050	0.036	**0.017
• V9-Business Entity Risk	6.719	3	2.240	0.830	0.012	−0.003	0.479
FACTOR 6: *Internal Forces*							
• V17-Velocity of Profit Risk	7.268	3	2.423	0.813	0.012	−0.003	0.488
• V28-Inflation Energy Risk	6.172	3	2.057	1.656	0.025	0.010	0.178
FACTOR 7: *Business Enterpr. Intang.*							
• V21-Competitive Risk	50.338	3	16.795	29.61	0.978	0.978	**0.003
• V20-Market Entry Risk	27.339	3	9.113	9.113	0.091	0.077	**0.008
FACTOR 8: *Profit and Inflation Forces*							
• V22-Business Climate Risk	2.556	3	0.852	0.983	0.015	0.000	0.402
• V12-Labor Risk	1.605	3	0.535	0.283	0.004	−0.011	0.838

**Note*: *$p < 0.05$, **$p > 0.01$.

(d) *commodity-type industries*. The regression examines the means and standard deviations of the SMEs across both endogenous and exogenous factors. The results show that commodity-type industries had higher means and standard deviations across the eight factors [see Table 6]. Thus, commodity-type industry firms proved to have a higher Entrepreneurial Risk Orientation (ERO) index levels based on the means and standard deviations [see Table 6].

Second, Table 7 illustrates the results of the second multivariate regression analysis. The second test for a multivariate regression was used to investigate more specifically the power of the covariates to adjust dependent variables multivariate regressions were run for each factor with each latent variable as the dependent variable. This was used with covariates acting as multiple predictors.

To test the relationship between industry type and factor variables, two hierarchical regressions were performed using the ERS factors scores as dependent variables. The results of these regressions are presented. Under Factor 1, V23-Government Regulation Risk ($p > 0.015$) was moderately significant. Under Factor 2, V27-Terrorism Risk

($p > 0.020$) and V26-Security Risk ($p > 0.028$) were moderately significant predictors of ERO levels. Under Factor 5, V15-Protection Devices Risk ($p > 0.017$) was moderately significant. Under Factor 7, V21-Competitive Risk ($p > 0.003$) and V20-Market Entry Risk ($p > 0.008$) were significant predictors of ERO levels. This indicates that four factors out of the eight had moderate to high significance [(see Table 7)]. Overall, then, results of the ERO index levels analyses further support the assertion that entrepreneurial risk patterns is multidimensional and that different types of risks are endemic in different industry types.

5. Discussion

The purpose of this research was to develop a taxonomy of entrepreneurial risk behaviors and examine its effect on SMEs. The eight-cluster taxonomy developed for this study provides a framework for understanding the dynamics of entrepreneurial risk and market behavior of SMEs. This study provides an in-depth analysis of entrepreneurial risk by empirically identifying its dynamics and relationship to business enterprises and market behavior. This empirical taxonomy builds on the prior research on and literature support on entreprenurial risk. This taxonomy also exhibits similarities with some of the prior studies and frameworks of other researchers (Busenitz, 1999; Heaton and Lucas, 2000; Ahwireng-Obeng and Mokgohlwa, 2002).

First, the results of the study provide some insight into entrepreneurial risk and its effect on SMEs. The entrepreneurial risk results further improve our understanding of the relationship between risk and business enterprises. For example, the factors loadings reveal an eight-factor solution (thus, an eight-factor taxonomy). This indicates there were eight risk factors that affect business enterprises. Second, the results reveal that entrepreneurial risk is highly multidimensional considering the range of firm risk behavior (Hirschey and Pappas, 1992; McAuley, 1986; Miles and Darroch, 2006). Therefore, the results from the data indicate the eight-factor dimension taxonomy is supported. Another interesting finding is the factors were not distributed equally in terms of ER coefficients. This indicates some factors with higher coefficients are more significant entrepreneurial risk variables than others are. Furthermore, the taxonomy developed from the factors appears to be credible in terms of entrepreneurial risk across both endogenous and exogenous risks.

Second, the eight-factor taxonomy developed from the study provides an empirically-supported framework for understanding entrepreneurial risk and its influence on business enterprises. The empirical taxonomy provides a foundation for classifying entrepreneurial risk behaviors with firms (SMEs). This study expands on the prior research of Busenitz (1999), Heaton and Lucas (2000), and Ahwireng-Obeng and Mokgohlwa (2002). For example, the factors, Factor 1-Industry/Economic Forces, Factor 2-Terrorism/Security Dynamics, and Factors 3- Government and Market Forces coefficients ranked the highest of the eight factors. Furthermore, the eight factors extracted from the exploratory factor analysis provide a strong basis for validity. Third, the taxonomy developed from the research provides two important contributions: (a) a creative approach for classifying

entrepreneurial risk behaviors; and (b) empirical assessment of entrepreneurial risk and its influence on business enterprises. Furthermore, the empirical taxonomy could possibly be applied to other fields of study such as finance, marketing and economics.

Finally, the test of examining industry type as a predictor variable in the data provided some interesting results. The analysis yielded mixed results. The results of the multivariate regression analysis revealed the four industry types (*consumer monopoly*, *consumer competitive*, *semi-commodity*, and *commodity type industries*) did not significantly differ in their coefficients. However, the commodity type industries had the highest means factor scores [see Table 7].

Interestingly, 45.8 percent of the SMEs were in *commodity-type industries*. This indicates most of the SMEs were businesses in *commodity-type* industries that are highly competitive. Most interestingly, there were minimal differences between the means and standard deviations between (a) *consumer monopoly type industries* ($M = 51.5$, $SD = 30.0$), *consumer competitive industries* ($M = 59.1$, $SD = 31.803$), (b) *semi-commodity type industries* ($M = 58.1$, $SD = 27.533$), and (c) *commodity-type industries* ($M = 60.8$, $SD = 29.322$). ERO was operationalized as the level of the risk behavior in the SME. If an SME has a higher mean and standard deviation, it has a higher *risk orientation* or a *more risky business venture*. Nevertheless, there were minimal differences between the industry types. Because the results of the cross-tabulation did not show significance between the four different industry types, the industry categories will need to follow the traditional SIC industry classification or further develop them.

5.1. *Limitations of study*

The study was limited by some constraints. First, the one limitation is the sampling of firms in the local metropolitan area. However, there is caution in terms of generalizing the results beyond this study. For example, the results of the study cannot be extended to other situations because there may be different empirical results. Second, another limitation was the use of self-reported data. There were limitations in with respect to collecting reliable data from entrepreneurs and small business owners who were willing to provide. The data could be vulnerable to bias. Therefore, the findings of the study need to be taken with some caution. Finally, a limitation was the use of a survey instrument. A mix method approach would possibly offer most insight into the study and data. Despite some of these limitations, this research makes a humble contribution to the field of entrepreneurship. This research hopes to raise more questions and build on research in entrepreneurial risk.

5.2. *Future research*

Several implications for future research are suggested by the findings. A surfeit of future research opportunities emerge. First, further research on risk patterns of SMEs can provide a platform for a more in-depth study. For example, there are still factors that affect SMEs that have not been explored, such as market dynamics and customer turnover. Second, there are opportunities to explore a longitudinal study of the firms that exhibited high ERO. It would provide significant opportunities for research in entrepreneurial risk

patterns and ERO levels. Research on these risk patterns over a course of time would provide an opportunity for more exploration.

Finally, there is an opportunity for research on minority SMEs. For example, we should ask if minority SMEs exhibit higher ERO index patterns despite socioeconomic influences. There are opportunities for research with this line of inquiry. The model can also be extended to study the overall entrepreneurial risk differences with female-owned SMEs. This would provide an avenue for more research in this area. This study is a first step in advancing knowledge on entrepreneurial risk as a theoretical construct. Indubitably, there is a dearth in the existing research on risk patterns of business ventures. This research can provide a platform for further research and make an enormous contribution to the field of entrepreneurship.

6. Conclusion

The major conclusions of this research make two important statements. First, entrepreneurial risk appears to be multidimensional as a construct, as evidenced by exploratory factor analysis (principle component analysis) of the ERS data that supported an eight-dimension taxonomy. It is evident from the research that both *endogenous* and *exogenous* variables have an equal influence on the risk behavior of SMEs. The study made taxonomy differences between the two proposed constructs of entrepreneurial risk. Nevertheless, the exploratory factor analysis results bore a different configuration mixing the two factors together. Finally, competitor levels have proved to be a significant latent variable from the results. This further suggests the number of competitors in the industry remains an important consideration for SMEs and this needs to be taken under consideration and most importantly for startup SMEs.

In conclusion, the findings of this study attempt to contribute to the foundation of entrepreneurship research. This study makes three important contributions to entrepreneurship research. First, we complement the current literature on entrepreneurial risk by empirically investigating risk factors and risk patterns that affect SMEs. Second, we provide an extension of the prior research by focusing the research on the entrepreneurial risk behavior of SMEs. Third, we provide a new inquiry of research that can possibly answer questions as to how entrepreneurial risk may act as an antecedent to business failure or firm discontinuance. This research allows us to examine firm behavior in terms of entrepreneurial risk behavior. As a theoretical model, the research provides a new inquiry and foundation on entrepreneurial risk as a construct. In conclusion, there is an opportunity to conduct further researcher specifically on SMEs. This research refines the knowledge on entrepreneurial risk and its effect on SMEs.

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