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RESEARCH ARTICLE

REVIEW

CASE STUDY

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CASE STUDY

Investigating and estimating the size of Shadow Economy by using monetary approach: Case study of Malaysia

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Abstract: The purpose of this study is to explore and estimate the size of Shadow Economy of Malaysia. This study used annual Time series data from 1980 to 2018, introduced Lending Interest Rate as additional variable for the first time to estimate the Shadow or dim Economy, and focused on the Currency Demand Approach (CDA) which is the best way of estimation the size of S.E. The results of ARDL, Unit Root Test (ADF) and Bound Test have also generated for the purpose. And this study investigated positive relationship between Currency Circulation to Money Supply Ratio and GDP, Inflation, Interest rate, and Total Tax Revenue through ARDL and estimated the required Shadow Economy, and also explored the Shadow Economy of Malaysia and estimated the size of S.E. Size of tax evasion community has also derived by present research which represent that taxes are not the only measures of Shadow Economy.

Keywords: Shadow Economy, ARDL, interest rate, GDP, currency, demand approach

1 Introduction

The shadow or black economy alludes to entire action work and business transactions that happen 'underneath the radar' and intentionally disguised – a financial movement that is undeclared and for which burdens that ought to be paid are not paying. Otherwise called the casual area, the dark economy, the black economy, or the dim economy, Shadow Economy also involves various crimes, for example, drug dealing and sneaking, just as legitimate positions, such as cultivation(involve child labor), working in development(disguised employment), or offering items to road drivers at rush or traffic signal places. Such type of the economy additionally involves such conditions where people are forced to work as serves without remuneration, or conditions where work is done in recompense for material things except cash. When fiscal experts are ascertaining the (GDP) of a nation, they must keep out things which contribute in the Shadow Economy. This scenario shows that each nation around the world is presumably significantly cash-rich than the officials measurements propose.

1.1 Statement of the problem

Malaysia is a developing country and being so it's facing so many economic problems like inflation, corruption, illegal activities, *etc*. that's are some reasons also behind the lower GDP of Malaysia. Unfortunately these illegal activities contribute to an unofficial sector mostly known as "Shadow Economy". Reorganization and measurement of S.E has been always remaining tough job for economist. In recent years there is a great debate about an Informal, Unparalleled and Unofficial sector all around the world, but in Malaysia, a few of piece of attempts are shown to estimate the Shadow Economy and all have done along MIMIC or Electricity Approaches. Entire research which presented long-run estimation of shadow Economy are sufficient till 2015.The need of the time was the computation of the extent of Shadow or dim economy through recent data and the use of advanced methods for best estimation.

1.2 Objective of the study

The core objective of present study insists to explore and estimate the Shadow Economy (S.E) and to see the correlation between different macroeconomic variables. Present study also aims to analyze the effect of Lending Interest Rate (LEINT), Gross Domestic Product (GDP), Inflation (INF) and Total Tax Revenue (TTR) on the Currency Demand. The study also motivated to give

the graphical representation of S.E and Tax Evasion and to give the policy recommendations on the behalf of the study to contribute in the betterment of Malaysia Economy.

1.3 Significance of the study

Present study estimates the size of Shadow Economy (S.E) of Malaysia and discusses the empirical aspect of the S.E and highlights the synchronous methodologies which used for obtaining the purpose. The study also analyzed the long run relationship among macroeconomic variables for the current time period and used Lending Interest Rate as an additional variable for estimation which is never used before for this purpose.

1.4 Scope and limitation of the study

The scope area of the study is to explore that sector of economy which is unofficial and not govern by any Government authority. This article attempts to point out Shadow Economy of Malaysia, so that it can be merged in official economy and contribute in betterment of Malaysia economy.

2 Literature review

There are many studies about developing and non-developing countries in which concept of "Shadow Economy" have been discussed. These studies showed the impact of gross domestic product, inflation and lending interest rate on the Shadow Economy of the Malaysia. These studies analyzed the extent of Shadow Economy how tax evasion encourage the Shadow Economy of Malaysia. Some famous studies reviews are given below.

Tan et al., 2017 [1] examined the area of the black economy for eighty countries for the time span of 1975-2012. The study involves Currency Demand Approach (CDA), Macroeconomic Uncertainty Index (MUI), Dynamic factor model (DFM) and Pooled mean group (PMG). The empirical results showed the presence of long run relationships between variables and interms of the adjustment coefficient. There was a visible cross regional variation with the lowest of 0.182 and the highest of 0.414. The macroeconomic uncertainty index variable show positive relationship, suggested that public tend to hold more currency in an uncertain macroeconomic environment. The developing country had relatively growing shadow economy (ranging from 19.9% to 37.3%). On average, the world computed the shadow economy as share % of GDP about 23.1%.

Ashok et al., 2016 examined observational and hypothetical ideas that inferred the shadow exercises in the official economy. The strategy includes MIMIC, ARDL, Error Correction terms (ECM), Engle, and Granger approach. Itemized econometric examinations have been directed to assess area and/or elements of Malaysia's unofficial economy. Investigation utilized the ARDL technique in the money request model to get a point assessor of the shadow Economy which is utilized in the MIMIC model to comprehend the elements of Shadow Economy since quite a while ago run. The assessed width of the Shadow Economy depended on just a pointer taxation rate. The length of the shadow or dim economy is steady for the test timeframe around half of the official GDP. While in the 1990s abnormal enlargement of the Shadow Economy around 70% of official one has seen because of bountiful tax avoidance in this period. Shahid (2014) [2] examined the short-run relationship and since quite a while ago run the connection between workforce, net fixed capital, and monetary development in Malaysia. The technique utilized Augmented Dicky Fuller, Phillip Perron, Johnson co-joining test, and vector blunder adjustment model. The time arrangement information was utilized from 1980-2012. Asiedu and Stengos (2014) [3] determined the extent of underground economy in country of Ghana. The time series data has been used from 1983 to 2003. The study adopted currency demand-approach to estimate the area of Shadow Economy in Ghana. Results of the currency demand model showed impact of the unofficial economy, this make interest rate statistically insignificant. The study estimated the average of underground economy which was approximately 35% of GDP from 1983 to 2003. In 1985 the average is high as 54% and in 1999 low as 25%. The long run average size of the Shadow Economy/to/GDP for Ghana by time series data was 40%.

Schneider and Buehn (2013) [4] examined the Size of the black economy, Methodologies, Open Questions and hurdles driven by it. The examination focused on two points. The first is the nonappearance of the ideal method for evaluation of the size of the Shadow Economy. The investigation similarly prescribed the MIMIC strategy used to get full-scale examinations of the size of the shadow economy. Also, the investigation underlined the definition and causal factors of the Shadow Economy to assess the size of the Shadow Economy using particular evaluation procedures. The findings showed that the genuine significance of the Shadow Economy is up 'til now missing. The association among the speculation and trial appraisal of the Shadow Economy

is up 'til now unacceptable thusly a satisfactory endorsement procedure should be created for the observational results to make it less difficult to condemn their believability.

Schneider (2011) [5] inspected the turn of events and the size of the black economy, undeclared work of workforce in OECD. The examination has taken creating and progress nations additionally into thought. The most persuasive variables on the Shadow Economy or potentially shadow workforce are charge arrangements and state guidelines, which, if they rise, increment both. Ongoing examinations cleared the financial chances, the general circumstance on the work market, and joblessness are critical for a comprehension of the elements of the shadow economy and its workforce. 48 million Shadow Economy workforces in exceptionally created OECD nations (Austria, Denmark, France, Germany, Italy, Spain, and Sweden) work illegally from 1997 to 1998.

Ahmed & Hussain (2010) [6] investigated the estimation about the extent of black economy of Malaysia, long run r/p between currency demand and rest of concerned variables including tax/to GDP ratio, financial development, interest rate and education. The study involved monetary approach, electricity consumption approach, MIMIC model and ARDL model. The time series data used from 1966-2008, findings showed ARDL technique for estimation of currency demand equation and education even as a -tv impact factor for unofficial economy. The ARDL approach and electricity consumption approach showed increased underground economy. The MIMIC mode reflects the size of informal economy, which is about 30%.

Buehn et al. (2010) [7] analyzed that the elasticity for money for shadow economy and for official GDP of German economy. The study emphasized difference between recorded output and actual output in monetary approach. In the unofficial economy all business transactions are typically carried out using payment method of cash. The findings proved that elasticity for money of Shadow Economy is much smaller than for official GDP. The second model which used to estimate money demand, is error correction model. The error correction model indicate that inclusion of Shadow Economy output measures can perform fast and better estimation of a money demand function.

Masood and Hussain (2008) explored the connection between the dark economy and macroeconomic variables (charge changes). The examination said that it was the first complete exercise to apply duty and tax change of the 1990s, it turns out to be exceptionally attractive to measure its effect on the dark economy and tax avoidance rehearses. The dark economy in Malaysia ends up being most noteworthy in the mid-60s when the corporate and individual annual expense rates were high. Total corporate pay and super duty rate were dropped to 40 percent in the later piece of the 80s. During the 1960s the underlying degree of the dark economy was high, so its development rate was low, around 2%. The most extreme individual annual assessment rate making the dark economy stay well above 30% of GDP throughout the timeframe of 1960-64. All the outcomes appear to accord with financial instinct. They indicated the dark economy as a level of GDP is diminishing over the long haul particularly after the thorough time of expense changes from 1997. A decrease in charge income because of diminished duty rates may adversely affect the financial government assistance of society.

Kemal (2007) [8] estimated the black economy by utilizing K and Q technique, the fundamentally disparity technique essentially they have determined the absolute utilization in private areas, from the household review of populace then it is changed for net exchange and ascertain genuine gauge of/GDP, which is contrasted with the GDP of National Income Accountability. The distinction b/w these two Gross Domestic Products is equivalent to the parallel economy. This investigation shows that size of the unofficial economy is ascending till the 1990s.

Alfredo et al. (2006) [9] investigated the interest of the Currency Approach and the extent of the Shadow or parallel Economy. As per the investigation, a way to deal with estimation of the area of the parallel economy, refer as "the money-related technique" depends on econometric appraisals of the cash interest. Appraisals ascertain the abundance dissemination of cash held by financial operators for money enrolled exchanges. This measure gave the concealed estimation of GDP. The standard cash approach utilizes the 17 abundance of money duplicated by the speed of flow to quantify concealed GDP. Just money is utilized for exchanges in the black economy. The reasoning of technique depends on the possibility of various pay/cash proportions. Discoveries recommended that the suspicion normally made in applied works of equivalent speeds along with pay versatility gauges comparatively lower than one result in figures, one-sided upwards and vice versa for the Shadow Economy.

3 Methods

3.1 Theoretical framework of the model

The money demand approach was first used by Cagan (1958) who considered the association between cash revenue and appraisal pressure (as one explanation behind the Shadow Economy)

for the United States over the period 1919 to 1955. Following 20 years Gutmann (1977) used a comparable technique anyway with no quantifiable systems. Cagan's philosophy was also advanced by Tanzi (1980, 1983) who evaluated a money demand work for the United States for the period 1929 to 1980 to discover the size of the Shadow Economy. His strategy anticipates that shadow (or concealed) trades are held onto as cash portions, to leave no discernible follows for the pros. Development in the size of the Shadow Economy will in this manner extend the premium in cash. To disengage the resulting plenitude of premium for cash, a condition for money demand is evaluated after some time. All customary likely components, for instance, the progression of pay, portion inclinations, advance charges, credit, and other commitment cards as a substitute for cash, and so forth, are controlled for. Also, such factors as the prompt and circumlocutory tax collection rate, government rule, state associations, and evaluation soul, which are believed to be the principal contemplations making people work in the Shadow Economy, are associated with the appraisal condition. The fundamental backslide condition for the cash revenue, proposed by Tanzi (1983) is the going with:

$$\ln(\mathrm{C/M2})\mathrm{t} = \alpha 0 + \alpha 1 \ln(1 + \mathrm{TW})\mathrm{t} + \alpha 2 \ln(\mathrm{WS/Y})\mathrm{t} + \alpha 3 \ln \mathrm{Rt} + \alpha 4 \ln(\mathrm{Y/N})\mathrm{t} + \mathrm{ut} \quad (1)$$

Where $\alpha 1 > 0$, $\alpha 2 > 0$, $\alpha 3 < 0$, $\alpha 4 > 0$, where ln implies basic logarithms, C/M2 is the extent of cash property to current and store accounts, TW is a weighted ordinary evaluation rate (to middle person changes in the size of the Shadow Economy), WS/Y is an extent of wages and pay rates in broad daylight pay (to find changing portion and money quick pauses), R is the superior paid on saving finances stores (to get the open entryway cost of holding cash) and Y/N is the per-capita installments. Any "excess" increase in real money or the aggregate unexplained by standard or run of the mill segments is then credited to raise the assessment rate and various reasons driving people to work in the Shadow Economy. Figures for the size and improvement of the shadow economy can be resolved in an underlying advance by differentiating the qualification between the headway of cash when the prompt and variant tax collection rate and government-rule have held all things considered diminished characteristics and the progression of money with the present higher load of duty evaluation and government-rule. Expecting in a second step a comparable compensation speed for money used in the Shadow Economy concerning genuine money in the official economy, the size of the shadow can be enlisted and diverged from the official GDP. This is one of the most typically used philosophies. It has been applied to various countries wherever on the planet.

3.2 Hypothesis of concerned study

Examination is attempting that theory of zero-effect of self-ruling components on a subordinate variable. Its undertaking to check whether the free factors hugely affect the subordinate variable or not so, there is Π to check whether it is equivalent to zero digit or not. The Mathematical form of this hypothesis is made as: H_0: $\Pi 0$; H_1: $\Pi 0$.

3.3 Brief explanation of variable

3.3.1 Currency circulation to money supply ratio (CM)

CM is the proportion of cash course to cash gracefully proportion, which speaks to the interest in money. (Current possessions to M2 and stores accounts)

3.3.2 Gross Domestic Product (GDP)

Total national output per capita is GDP apportioned by mid-year people. Gross Domestic Product is the measure of gross worth adds up by all occupant suppliers of the economy notwithstanding anything costs and less any gifts rejected from assessment of the material things. It is resolved without making inductions for the disintegration of made assets or fatigue and defilement of trademark resources.

3.3.3 Inflation (INF)

Expanding as evaluates by the client esteem list reflects the yearly rate change in price for the ordinary customer of getting a container consists on items and endeavors that sometimes changed at decided schedules fixed in nature, for instance, yearly.

3.3.4 Interest Rate (LEINT)

The advancing rate is the percentage levied from the banks on credits to the private region. It is commonly the bank rate that by and large meets the short-term and also medium-term financial needs of the private territory.

3.3.5 Total Tax Revenue (TTR)

Hard and fast cost pay exhibits the part of a country's yield that is assembled by the organization through obligations. It will in general be one extent of how much the organization controls the economy's resources.

3.4 Sources and data type

Examination used yearly (discretionary) course of action data for the time span of 1980-2018. The reason behind period has been chosen is the concerned data in light of a legitimate concern for cash work was likely going to be available. Condition is evaluated using the Auto-Regressive Distributed Lag system with picked data on Malaysia. Except if regardless decided, all the data has been drawn from the official locales of "trading money related angles", "world progression marker" and "The GlobalEconomy.com".

4 Computation, empirical results, and interpretation

4.1 Augmented Dickey-Fuller

Above all conditions, we have applied the expanded Augmented Dickey-Fuller refer as ADF, unit root test for each factor that tested for criticalness of the free factors expecting that the preference of slacks is consisted to guarantee non-extra autocorrelation. After first differentiation results over entire the period and at the level both are represented in Table 1. The overall test exhibits that entire components contain mixes of unit root at the level as they were got going to be fixed behind the chief qualification and at the level.

Table 1 Results of Unit Root test (Augmented Dickey-Fuller test)

Variables	On Level		On 1st Difference		Conclusion
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
LCM	–	- -	-4.486659 (0.0010)	- -	I(1)
GDP	-3.861527 (0.0002)	- -	–	- -	I(0)
INF	-4.961567 (0.0002)	- -		- -	I(0)
LEIR		- -	- -	-5.231087 (0.0007)	I(1)
TTR		-4.296982 (0.0082)			I(0)

Source: Authors own calculation based on E-views 9

Table 1 shows unit root tests. The notations: (LCM), (GDP), (INF), (LEIR), (TTR) indicate respectively the Demand for Cash, Gross Domestic Product, Inflation, Lending Interest Rate, and Total Tax Revenue.

4.2 Autoregressive Distributed Lag (ARDL)

This method of ARDL was created by Pesaran and Shin to decide the since quite a while ago run connection between factors. This brand-new testing has a preferred position over the past systems of Johanson that it might be applicable in specific circumstance when entire elements are composed at dual solicitation I(0) and I(1) instead of all elements should be at a similar solicitation of the fuse. ARDL results are given in Table 2 and 3.

Table 2 ARDL Results with TTR (n = 39, from 1980 to 2018))

Regressors	Coefficient	Standard Error	T-Ratio	Prob.
GDP	0.000008	0.000002	3.384399	[0.0028]
INF	0.023307	0.014790	1.575901	[0.1300]
LEINT	0.032110	0.007640	4.202690	[0.0004]
TTR	0.327027	0.126046	2.594506	[0.0169]

Note: Authors own calculation based on E-views 9; Estimated Long Run Coefficients using the ARDL Approach; ARDL (1, 1, 1, 0, 5) selected based on Akaike info Criterion; LMC is dependent variable.

4.3 The empirical results and interpretation of the regression

In Table 1, 2 and 3, value of coefficient of Gross Domestic Product (GDP) shows that there is +tv and significant r/p between the dependent variable MONEY CIRCULATION TO MONEY SUPPLY RATIO (CM) and Gross Domestic Product (GDP). Empirical result shows that in

Table 3 ARDL Results without Tax (n = 39, from 1980 to 2018))

Regressors	Coefficient	Standard Error	T-Ratio	Prob.
LEIR	0.021716	0.006863	3.164267	0.0057
INF	0.003150	0.012810	0.245905	0.8087
GDP	0.000004	0.000001	3.583498	0.0023

Note: Authors own calculation based on E-views 9; Estimated Long Run Coefficients using the ARDL Approach; ARDL (3, 3, 5, 2) selected based on Akaike info Criterion; LMC is dependent variable.

the long run, 1 unit change in GDP leads to 0.000008 percent (with tax) and 0.000004 percent (without tax) increase in the CM. This shows that an increase in GDP impacts CM positively and it seems to express that increase in GDP is efficient to increase the CM in the country. My study supports the results of Farooq et al., 2010 that there is an increase in Gross Domestic Product (GDP) that impacts Currency to Money Supply ratio positively. There may be different reasons behind this but the most ostensible reason is the increased GDP reflects the increased underground economic activities that are leads to more currency demand in society.

The value of coefficient of Interest Rate LEINT has positive and significant impact on Currency to Money Supply ratio. A unit increase in value of LEINT increases 0.032110(with tax) and 0.021716(without tax) percent point of CM. The positive sign of coefficient of LEINT indicates that the currency demand. People will earn money from illegal sources instead of borrowing from financial institution.

In our empirical testing, coefficient of Inflation (INF) shows a unit increase in Currency to Money Supply ratio (CM) will improve CM by 0.023307(with tax) and 0.003150(without tax) percent. The coefficient's value of INF shows +tv and significant impact. Our studies reinforce the findings of Sumeet et al., 2015 that Demand for cash is most affected in the presence inflation factor. When inflation rises up, people demand more cash for day to day transactions. Their tendency to earn money through unfair means will lead them to Shadow Economy.

The coefficient of TTR there is also found +tv and significant impact. A unit increase in TTR will expend Currency to Money Supply ratio (CM) 0.327027 percent. The positive impact of TTR on CM demonstrates significant r/p and macroeconomic strength. Our results also found TTR an important causation of CM. An increase in direct and indirect taxation increases the Shadow Economy. Friedrich S (2011) [10] exhibit the +tv r/p between TTR and our Shadow Economy also supporting our study. The theory demonstrates that a rise in Total Tax Revenue (TTR) contribute in the area of Shadow or dim Economy That leads to increased money circulation among people and demand for money.

All coefficients values indicate significant results and exhibit +tv impact on Shadow or dim Economy in Malaysia.

5 Estimated size of Shadow Economy

After the predicted calculated value of the currency demand model, the magnitude of underground economy determined as follows. For every year the estimated values of currency demand model with taxes (CM)T and without taxes (CM)WT are determined by employing predicted regression equations:

$$LCM = a_0 + a_1 GDP + a_2 INF + a_3 LEINT + a_4 TTR \text{ (with taxes)} \quad (2)$$

$$LCM = a_0 + a_1 GDP + a_2 INF + a_3 LEINT + a_4 TT \text{ (without taxes)} \quad (3)$$

The change of (CM) T – (CM) WT demonstrates the level of cash holding that is because of taxes alternatively have limit that total tax Revenue have influence people to hold higher amount of cash. The extent of increased demand for cash demonstrates the size of community of tax evasion which termed as "illegal money". The mathematical expression for illegal-money (IM) can be confined as:

$$\text{IM} = [(\text{CM})\text{T} - (\text{CM})\text{WT}] \times \text{M2} \quad (4)$$

Since Tanzi witnessed that legal money (LM) can be obtained with the difference between M1 and IM. M1 is the sum of currency and demand deposits that is total money supply and estimated illegal money. The mathematical form is stated as follow:

$$\text{LM} = \text{M1} - \text{IM} \quad (5)$$

After obtaining the legal money, the income velocity (circulation velocity) of legal money can be computed, dividing the GNP by LM which mathematical elaboration is given below:

$$\text{IV} = \text{GNP}/\text{LM} \quad (6)$$

As the basic assumption of the model considers the velocity of legal money and illegal money same-thing, thus the magnitude of Shadow Economy is the result of the product of illegal money and income velocity of money. Mathematically it can be stated as follow:

$$\mathrm{SE} = \mathrm{IM} * \mathrm{IV} \tag{7}$$

Taxes are one of the biggest reasons of Shadow Economy but we don't blame them for the cause of entire Shadow Economy, Shadow Economy even also exists when taxes are not levied on the people. According to an economist corruption, non-registered businesses, beggars, hawkers etc. are also lied in the category of Shadow Economy and above graphs are reflection of this definition. As we can see slope of these graphs are almost same but still there is difference between values. Shadow Economy has greater values and tax evasion represented comparatively low ones in corresponding years. The gap of these values is the reason that taxes are not the only reason of Shadow Economy, other factors also contribute in it. (see in Figure 1, 2 and 3)

Figure 1 Size of Shadow Economy

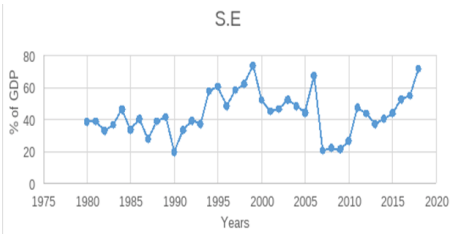

Figure 2 Shadow Economy as % of GDP

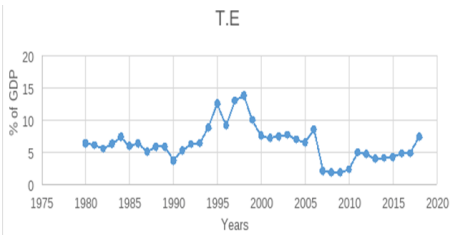

Figure 3 Tax Evasion as % of GDP

6 Conclusion and policy advices

Magnitude of Shadow Economy is highly responding to taxes, so government should make easy tax collection methods so that non tax payers can easily come in the category of tax payers. Good governance system and government check n balance may help in reducing magnitude of the black economy in Malaysia. As we know taxes are not the only measures of S.E and other factors are also involved so government should improve and update its record keeping system so that they can detect the hidden economic activities. An adoption of policy based on these findings would lead to a successful emergence of the Shadow Economy in to the official

Availability of data and material

All results reported in this research was carried out in Eviews 9 computational environment. Data used in this research are taken from https://www.theglobaleconomy.com.

Conflict of interest

The author declares no conflict of interest.

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RESEARCH ARTICLE

Venture capital, enterprise performance and accounting information quality – GEM listed companies of China

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Abstract: Aim of this study is to find the relationship between venture capital, accounting information quality, and corporate performance using the GEM listed companies' data from 2000 to 2019. Empirical analysis found that venture capital participation has a significant role in promoting corporate performance. Results show that higher accounting information quality has a significant role in promoting corporate performance. The characteristics of venture capital have a significant role in regulating the relationship between accounting information quality and corporate performance.

Keywords: venture capital, accounting information quality, corporate performance, enterprise performance

1 Introduction

Over the past 30 years, China's venture capital development opportunities and challenges coexist. Although great progress has been made, compared with foreign countries, there is still a long way to go. The theories and systems of venture capital are not yet mature [1]. Compared With traditional financing methods, venture capital has unique advantages. In addition to providing companies with long-term stable funds, more importantly, the value of intangible assets attached to it has played an important role in promoting corporate growth. After reviewing the literature, it is found that in the past, most scholars separately studied the impact of venture capital on the quality of accounting information and corporate performance [2]. The proposal of "mass innovation and entrepreneurship", the arrival of the economic transition period, and the explosive development of the financial industry, China's venture capital market has expanded rapidly in recent years. According to the latest venture capital trend report released by KPMG, the pulse of Venture capital It shows that in 2018, China's venture capital transaction volume reached 70.5 billion U.S. dollars, an increase of 52.9% over 2017. According to a report released by the startup company database in the first 10 months of 2018, China's venture capital exceeded the United States and ranked first in the world. Few scholars linked the three to the dynamic investigation. This article believes that there is a close relationship between venture capital, accounting information quality, and corporate performance. Therefore, this article attempts to start from the perspective of the moderating effect of venture capital and integrate the three into the same analytical framework to deeply explore the close relationship between venture capital, accounting information quality, and corporate performance [3].

2 Literature review and research hypothesis

2.1 The regulatory role of venture capital

While the venture capital brings capital to the enterprise, it also helps the enterprise improve its internal management system [4, 5]. The supervision of the company's management Will urge them to standardize the company's financial standards, improve the true reliability of financial statements, thereby improving the quality of accounting information: and help the company's management to make reasonable business decisions and development plans based on financial conditions, and can also reduce The occurrence of moral hazard and principal-agent risk can improve the efficiency of corporate governance, reduce operating costs, realize the optimal allocation of the company's existing resources, and maximize corporate value [4–7]. The greater

the relationship between venture capital and the interests of enterprises, the more attention Will be paid to the level of accounting information quality of enterprises [2, 8, 9]. Therefore, the supervision and management of enterprises will be closer, thereby improving the performance of enterprises. Based on the above analysis, this article proposes the following hypotheses:

H1a: Venture capital participates in the positive adjustment of the impact of accounting information quality on corporate performance.

H1b: The proportion of venture capital holdings positively regulates the impact of accounting information quality on corporate performance.

H1c: Joint venture capital positively regulates the impact of accounting information quality on corporate performance.

2.2 Venture capital and corporate performance

A review of domestic and foreign literature shows that scholars hold two Views on the relationship between venture capital and corporate performance: the former promotes or inhibits the latter. Some scholars believe that due to the existence of factors such as opportunistic behavior, principal-agent risks, and moral hazards, venture capitalists and corporate managers have different interest demands, and investors are either eager to exit to seek excess returns or to build a good reputation. Pushing immature companies to IPO, the true value of the company has not been fully utilized at this time [10, 11]. In the daily operation of enterprises, investors and managers have different opinions. Which decides the enterprise unable to be issued quickly, Which Will make the enterprise missed opportunities, and the mistakes of venture capitalists in decision-making Will hinder the healthy development of the enterprise. In joint venture capital, each investment subject has different interest goals. After the company is successfully listed, their "true colors" Will gradually be revealed. Each institution hopes to "get a share" from it but is unwilling to undertake the subsequent operations of the company. The risk of failure. Based on the above conclusions, some scholars have concluded that the performance of enterprises supported by venture capital is poor. Studies demonstrations that venture capital institutions only focus on the pursuit of reputation and benefits in the development stage of startups, and ignore the supervision and governance of listed companies, causing significant losses to investors and failing to enhance the value of the company [4, 12]. Besides, most researchers believe that venture capital Will promote company performance growth. Venture capital has the functions of certification, supervision, screening, etc. In addition to a large number of funds: it also brings intangible value-added services to enterprises and promotes technological innovation. A few scholars believe that the performance of companies with venture capital participation is better because venture capital has a "screening" function Which evaluates the financial performance, development potential, investment field, and other aspects of the target company before determining the investment, eliminating market performance Inferior companies, high-performing companies have good development potential before venture capital enters. The good market reputation of venture capital institutions helps companies attract more external investors. Venture capitalists often have rich management experience and broad contacts [6, 12, 13]. These additional values lay a solid foundation for the company's long-term development. Study shows that value-added is the main driver of performance growth for companies with a venture capital background [3], also found that high reputation risk investment institutions will help the invested company improve its operating mechanism and improve business capabilities to maintain its reputation and market position, and ultimately achieve the goal of improving corporate performance [8]. Another empirical research shows that venture capital will promote enterprises to maximize the value in terms of strategic planning, organization structure optimization, and cost reduction [14]. Compared with independent investment, the support of two or more venture capital institutions can bring greater value to the company [7]. Also finds that a high shareholding ratio and joint venture capital will both promote business performance growth [4]. Based on the above discussion, this article proposes the following hypothesis:

H2a: There is a significant positive correlation between venture capital participation and corporate performance.

H2b: There is a significant positive correlation between the proportion of venture capital holdings and corporate performance.

H2c: There is a significant positive correlation between joint venture capital and corporate performance.

2.3 Accounting information quality and corporate performance

Improving the authenticity and legitimacy of corporate financial data can to a certain extent alleviate the moral hazard caused by information asymmetry, reduce the uncertainty risk faced

by investment institutions, avoid unnecessary financing costs, and improve the efficiency of corporate investment and financing, realize the optimal allocation of resources, and finally achieve the goal of promoting the stable growth of the enterprise. The higher the quality of the accounting information disclosed by a company, the truer the company's financial status and operating level Will be communicated to external investors and stakeholders. Investors can also rationally judge Whether they want to cooperate with the company in the next step. The long-lasting and stable cash how has come to avoid the dilemma of financial difficulties When the company's operating profits decline or the performance declines due to poor market conditions, and investors suddenly Withdraw. Results of the study shows that improving the quality of accounting information disclosure can effectively promote corporate performance improvement [15,16]. Research have found that there is a positive correlation between accounting information transparency and accounting performance and market performance [17]. Based on the above analysis, this article proposes hypotheses:

H3: There is a significant positive correlation between the quality of accounting information and corporate performance.

3 Research design

3.1 Sample selection and data sources

The article takes the companies listed on the Shenzhen Growth Enterprise Market from 2000 to 2019 as a sample, excluding ST, *ST companies, financial and insurance companies, and companies with incomplete financial data, and finally, select 369 companies as the research objects. The research data in this paper mainly comes from the C SMAR database, and the data on the background of corporate venture capital mainly comes from manual collection and collation, using Excel and Stata software to collate and empirically analyze the data.

3.2 Variable definition

3.2.1 Variables

The corporate performance evaluation indicator system is composed of profitability indicators, debt solvency indicators, development ability indicators, and operating capacity indicators. Based on previous studies, because of the strong representativeness of the return on equity (ROE) in profitability indicators, here, the return on net assets is selected as the explained variable.

3.2.2 Explain the variables

This paper adopts the research method of Bhattacharya and others and uses the earnings stimulus (EA) as an indicator to measure the quality of accounting information. It shows the tendency of listed companies to delay the recognition of losses and accelerate the recognition of earnings, reflecting the relationship between listed companies' reported earnings and real earnings. The higher the EA, it means that the management of the company is more likely to deliberately hide the actions of the company's operating performance to create the appearance of good operating conditions, to implement earnings management behaviors, and lower the quality of accounting information. Since the value of the earnings surge is positive or negative, a positive EA (+) indicates the earnings surge. The larger the value, the lower the quality of accounting information; the negative EA (-) indicates the degree of earnings conservative, and the larger the value, the accounting the higher the quality of the information. To maintain the consistency of the research significance of the positive and negative earnings stimulus, this article draws on Guo (2012) [18] the solution is to multiply EA (+) by -1, so the larger the value of EA, the lower the quality of accounting information. The calculation formula of EA is $EA_t = (EARN_t - NCF_t)/ASSET_{t-1}$, among them EARNt is the company's net profit for the year, NCFt is the company's net cash flow from operating activities that year, ASSETt-1 is the company's total assets at the beginning of the year.

3.2.3 Adjust the variable

This article selects venture capital participation (VC), venture capital holding ratio (VCH), and whether to join venture capital (VCJ) as the moderator. Combining the R18 Financial database and the prospectus of listed companies, if the company's top ten shareholders involve venture capital, it is recorded as 1, otherwise, it is 0; the venture capital holding ratio is based on the company's top ten shareholders of venture capital institutions. The sum of the proportions is derived; if the company's top ten shareholders have two or more venture capital institutions, it is recorded as 1, otherwise, it is 0.

3.2.4 Control variables

Comprehensive analysis of previous research, this article selects asset-liability ratio (LEV), asset turnover (TAT), quick ratio (QR), enterprise size (SIZE), industry dummy variable (IND), and year dummy variable (YEAR) as control variables.

3.2.5 Model construction

To verify Hypothesis 1, this paper uses venture capital as the explanatory variable (see in Table 1), and corporate performance as the explained variable, and constructs the following linear regression model:

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCD} + \beta_2 \mathrm{LEV} + \beta_3 \mathrm{TAT} + \beta_4 \mathrm{QR} + \beta_5 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (1)$$

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCH} + \beta_2 \mathrm{LEV} + \beta_3 \mathrm{TAT} + \beta_4 \mathrm{QR} + \beta_5 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (2)$$

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCJ} + \beta_2 \mathrm{LEV} + \beta_3 \mathrm{TAT} + \beta_4 \mathrm{QR} + \beta_5 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (3)$$

To verify Hypothesis 2, this paper takes the quality of accounting information as the explanatory variable and the performance of the enterprise as the explained variable, and constructs the following linear regression model:

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{EA} + \beta_2 \mathrm{LEV} + \beta_3 \mathrm{TAT} + \beta_4 \mathrm{QR} + \beta_5 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (4)$$

To verify Hypothesis 3, this paper constructs the following linear regression model:

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCD} + \beta_2 \mathrm{EA} + \beta_3 \mathrm{VCD} \times \mathrm{EA} + \beta_4 \mathrm{LEV} + \beta_5 \mathrm{TAT} + \beta_6 \mathrm{QR} + \beta_7 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (5)$$

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCH} + \beta_2 \mathrm{EA} + \beta_3 \mathrm{VCH}^* \mathrm{EA} + \beta_4 \mathrm{LEV} + \beta_5 \mathrm{TAT} + \beta_6 \mathrm{QR} + \beta_7 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (6)$$

$$\mathrm{ROE} = \beta_0 + \beta_1 \mathrm{VCJ} + \beta_2 \mathrm{EA} + \beta_3 \mathrm{VCJ}^* \mathrm{EA} + \beta_4 \mathrm{LEV} + \beta_5 \mathrm{TAT} + \beta_6 \mathrm{QR} + \beta_7 \mathrm{SIZE} + \mathrm{YEAR} + \mathrm{IND} \quad (7)$$

Table 1 Variables description, symbols, name, and type

Variable name	Variable Symbol	Variable Type	Description
ROE	ROE	Explained variable	Net profit at the beginning of the period/Net assets at the end of the period
Earning volatility	EA	Explanatory variable	Reflects the extent to which the income volatility of listed companies deviates from the true income volatility
Assets & liabilities	LEV		Total liabilities/total assets
Asset turnover	TAT		Operating income [(total assets at the beginning of the period + total assets at the end of period)/2]
Quick ratio	QR		Company's quick assets/total assets at the end of the period
Enterprise size	SIZE	Control variables	The log of the company's total assets at the start of the period
Industry	IND		Virtual variable
Year	YEAR		Virtual variable
Venture capital participation	VCD		Dummy variable, take 1 if there is venture capital among the top 10 shareholders of the enterprise, otherwise 0
Venture capital holding ration	VCH	Moderator variable	The sum of the Shareholding ratios of the venture capital institutions among the top 10 shareholders of the
Venture capital	VCJ		Dummy variable, if there are two or more venture capital institutions in the top 10 shareholders of the company take 1, otherwise 0

4 Empirical results and analysis

4.1 Descriptive statistical analysis

Table 2 shows the descriptive statistics of the main variables.

Table 2 Descriptive statistics

Variables	Observations	Mean	St.Dev.	Min	Max
ROE	1845	0.1559	0.1499	-1.9999	1.7664
EA	1845	0.0336	0.1444	-0.9994	2.9922
VCD	1845	0.5888	0.5009	0	1
VCH	1845	0.0666	0.0889	0	0.6565
VCJ	1845	0.3106	0.4066	0	1
LEV	1845	0.4441	0.1996	0.0495	1.6879
QR	1845	4.0089	3.269	0.2256	38.2222
TAT	1845	0.9191	0.4965	0.0516	3.2668
SIZE	1845	20.5982	0.8866	17.5522	24.7222

Among the 1476 effective samples of 369 listed companies on the Shenzhen Growth Enterprise Market from 2000 to 2019, the average value of VCD is 0.488, indicating that less than half of the sample companies have venture capital backgrounds. The average value of VCH is 0.051, indicating that the proportion of venture capital holdings is relatively low. The average value of VCJ is 0.209, indicating that about one-fifth of companies with a joint venture capital background. The average value of ROE is 0.179, the maximum value is 1.766, and the minimum value is -0.352, indicating that there is a certain gap in the performance of listed companies, and most companies are operating in good condition. The average value of EA is 0.036, the maximum value is 2.882, and the minimum value is -0.748, indicating that there is a large

gap between the quality of accounting information in the sample companies, and the quality of accounting information of most companies is better. The average value of LEV is 0.33, indicating that the debt financing of the sample companies is low, and most companies have better development prospects, but the maximum value is 1.687, indicating that a small number of companies solve financing problems through loans and are easy to fall into financial crisis. The average value of QR is 3.064, indicating that the sample companies have strong short-term solvency. The average value of TAT is 0.747, indicating that most sample companies have higher sales revenue. The mean value of SIZE is 20.443, indicating that the sample enterprises are generally larger in scale. The correlation test of the sample data shows that there is no obvious correlation between the data, which provides the possibility for correlation analysis later.

4.2 Regression analysis

Table 3 lists the regression results of the hypothesis 1 test on the sample data. From the second column of Table 3, we can see that venture capital participation and corporate performance are significantly positively correlated at the level of 5%, indicating that venture capital support Will significantly improve corporate performance. Hypothesis la has been explained. Venture capital not only solves the financing constraints of enterprises, and brings intangible value-added services to enterprises, but also can formulate reasonable strategic planning for enterprises, strengthen the supervision and management of enterprises, and bring reputation and benefits to themselves at the same time. Improve the performance of the enterprise and achieve a Win-win effect. The third column of Table 3 reflects the positive correlation between the proportion of venture capital holdings and corporate performance, but it is not significant. Hypothesis lb. fails the test. It may be because the proportion of venture capital shares held by listed companies at the time of IPO is low, an effective equity check and balance mechanism have not been formed, the control of the invested company is insufficient, supervision is not in place, and the intervention of venture capital still has room for improvement in improving corporate performance [16, 18]. The fourth column reflects that joint venture capital has no obvious promotion effect on corporate performance, so hypothesis 10 is rejected. Although joint venture capital can diversify investment risks, improve investment portfolios, share information resources and make up for each other's technical shortcomings, the communication and coordination between joint venture capital partners will generate additional costs for invested companies and reduce corporate performance.

Table 3 Regression results of venture capital & accounting information quality on corporate performance

Variables	(Model 1)	(Model 2)	(Model 3)	(Model 4)
	ROE	ROE	ROE	ROE
VCD	0.0226*			
	(0.0047)			
VCH		0.0409		
		(0.0599)		
VCJ			0.0044	
			(0.0144)	
EA				0.3663***
				(0.0645)
LEV	-0.1801	-0.2288	-0.1919	-0.19944
	(0.0944)	(0.0995)	(0.0994)	(0.0881)
QR	-0.0033	-0.0011	-0.0011	-0.0009
	(0.0029)	(0.0029)	(0.0019)	(0.0019)
TAT	0.3646***	0.3611***	0.2669***	0.2669***
	(0.0377)	(0.0377)	(0.0379)	(0.0277)
SIZE	-0.0446***	-0.0444***	-0.0344***	-0.0339***
	(0.0114)	(0.0114)	(0.0104)	(0.0094)
IND	Control	Control	Control	Control
YEAR	Control	Control	Control	Control
Constant	0.8954***	0.8994***	0.7998***	0.8061***
	(0.3399)	(0.2323)	(0.3232)	(0.1986)
N	1845	1845	1845	1845
R^2	0.5950	0.4949	0.4955	0.5506

Note: ***, **, * represent significant at the level of 0.01, 0.05 & 0.1 respectively.

4.2.1 Accounting information quality and corporate performance

The fifth column of Table 3 reflects that the quality of accounting information has a positive effect on corporate performance, and it is significant at the level of 1%. For each additional unit of EA, ROE Will increase by 0.2630 units, indicating that the improvement of accounting information quality can improve the company Performance, so hypothesis 2 is not rejected. This is the same as Zhang et al. (2007) [16] compared with the companies with lower quality of

accounting information disclosure, the research shows that companies with a higher quality of disclosure also have higher performance levels.

4.2.2 The regulatory role of venture capital

Table 4 lists the regression results analysis of the hypothesis 3 test on the sample data. In Model 5, the coefficient of VCD*EA is significantly positive, indicating that VC participation has a significant moderating effect on the relationship between the quality of accounting information and corporate performance. Accept hypothesis 3a. Venture capitalists rely on their professional management experience and rich resources, to obtain excess returns When venture capital is Withdrawn, they Will inevitably strengthen supervision in the business process of the enterprise to avoid the business development of the enterprise from deviating from the normal track [20]. In the sixth and eighth columns, the coefficients of VCH*EA and VCJ*EA are significantly negative, indicating that the proportion of venture capital holdings and joint venture capital Will inhibit the effect of accounting information quality on corporate performance [20, 21]. Equity ratio and joint venture capital have a significant negative moderating effect 011 the impact of accounting information quality on corporate performance, so Hypothesis 3b and 30 are rejected. It is found that the proportion of venture capital holdings and the growth of the company are in an inverted U-shaped relationship. 0nly When the number of holdings reaches the appropriate ratio, Will it have a positive impact on corporate performance [9]. The too low shareholding ratio show 5 that venture capital institutions have not formed sufficient equity checks and balances for enterprises, and cannot effectively supervise the quality of accounting information. Therefore: they cannot promote the level of business performance. An excessive shareholding ratio means that venture capital institutions have too much control over the enterprise, and investors Will make behaviors that damage the development of the company for their own interests. The existence of joint venture capital institutions will cause more serious internal conflicts of interest, higher agency costs, non-concentration of equity, and encourage "free-riding" behaviors that are not conducive to corporate growth [6].

Table 4 Regression result of moderating effect of venture capital

Variables	(Model 5)	(Model 6)	(Model 7)
	ROE	ROE	ROE
EA	0.4411***	0.4429***	0.4344***
	(0.0654)	(0.0778)	(0.0776)
VCD	0.0277***		
	(0.0055)		
VCD*EA	0.1415**		
	(0.0499)		
VCH		0.0991**	
		(0.0335)	
VCH*EA		-2.0707***	
		(0.3939)	
VCJ			0.0303*
			(0.0101)
VCJ*EA			-0.4488***
			(0.0667)
LEV	-0.1515	-0.1419	-0.1277
	(0.0813)	(0.0808)	(0.0766)
QR	-0.0009	-0.0009	-0.0005
	(0.0019)	(0.0019)	(0.0019)
TAT	0.2499***	0.2499***	0.2439***
	(0.0339)	(0.0339)	(0.0239)
SIZE	-0.0352***	-0.4646***	-0.4646***
	(0.0089)	(0.0086)	(0.0086)
IND	Control	Control	Control
YEAR	Control	Control	Control
Constant	0.8989***	0.8787***	0.8573***
	(0.1961)	(0.1888)	(0.1828)
N	1845	1845	1845
R2	0.5566	0.5377	0.5599

Note: ***, **, * represent significant at the level of 0.01, 0.05 & 0.1 respectively.

5 Conclusion and recommendations

Through empirical research on the relationship between venture capital, accounting information quality, and corporate performance, this article draws the following conclusions: There is a positive correlation between venture capital participation and corporate operating performance. The deeper the degree of venture capital participation in the company: the better corporate performance. There is a positive correlation between the quality of accounting information and business performance. The higher the quality of accounting information, the better the

performance of the company; the participation of venture capital can significantly enhance the correlation between the quality of accounting information and corporate performance, as the degree of participation in venture capital increases. The increase in the quality of accounting information can promote the improvement of business performance. Based on the above conclusions, this article puts forward the following suggestions: First, when companies introduce venture capital, they must comprehensively consider various indicators of venture capital institutions, such as market reputation, investment experience, and management team. Stronger venture capital institutions can attract more investment projects for enterprises, and rich management experience can help improve the company's governance level and can bring high-quality service value in all aspects of the company's daily operations. Secondly: venture capital institutions should also enhance their comprehensive strength, continue to accumulate investment experience, strengthen business capabilities, cultivate professional teams, focus on reputation building, and perform their duties to the invested company to ensure that both parties can obtain the maximum benefit. Finally, companies should focus on improving the quality of accounting information and cultivating high-quality financial teams; regulatory agencies should also strengthen the supervision of the financial reports of listed companies: improve the accounting information disclosure system, and prevent the management from implementing earnings management for private interests.

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RESEARCH ARTICLE

Ensuring risk-free e-banking services in Russian-economy: Policy guidance

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Abstract: In today's e-banking, customers compete for comparative time-saving-options. Banks compete for maximizing profits. But many factors are unpredictable. These are perceived risks factors (PR) that undermines growth trends of e-banking in economy country-wise such as Russia. Bank-deposits, bank-accounts are covered by Deposit Insurance System (DIS) in Russian-economy. However, PR-factors are not covered. It causes abuses. Addressing the *dilemma*, application of Akim's model – *Voluntary Insurance* (VI) as a product can be instrumental attracting more individuals using e-banking. Welfare Analyses are used as guidance for ensuring efficiency-cost or competitive pricing of the VI so that it becomes appealing to both customers and Banks. When bank is an insurance-provider, under asymmetric-information, existence of adverse-selection-group is detected where estimated welfare-cost associated with inefficient pricing created by adverse-selection is small. However, advantageous-selection-group in market results opposite. The findings can be helpful in policy-design ensuring risk-free digital-banking, which can attract policy-practitioners in Russia. Using customers-opinions can facilitate empirical studies.

Keywords: e-banking, perceived-risk, voluntary insurance, adverse-selection, advantageous selection

1 Introduction

Today humankind lives in world of business-mentality where services are carried out in multi-faceted, competitive and rationality manner. Time values in today's world are counted more than ever before no matter where an individual resides. Thus, decision-factors mainly expediency and cost-effectiveness have led individuals or businesses welcoming usages of ICT in multi-faucets. As a result, in technology-driven world country-wise, service sector like banking has been modernized. Similarly, customers compete for comparative time-saving-option(s) marginalizing its operating costs. In this progression, Russian economy is no exception [1]. Besides traditional banking in Russia-economy, Yandex Money, MTS-Money, Fancy, Megafon, Yandex and Mobile Wallet, *etc.* are new ways of financial services [2]. However, it faces more fraudulent transactions than that in any other country [3].

There is no doubt that digital banking is an important product in financial sector without boundaries. However, it is characterized by evolving many factors that are often unpredictable [4]. It faces serious pitfalls being it riskiness. Customers compete for time-saving options. Banks compete for marginalizing its operating costs then enhance revenues. Most cases, customers do not read terms & conditions of services and they do not save contract-copy. These weaknesses cause abuses. Customer faces perceived risk such as hidden charges, *extra* fees, account hacked, *etc.* [1,5,6].

In Russia, the main financial regulator is the Central Bank of the Russian Federation. It is also called Central Bank that oversees the monetary policy and regulates the financial industry in Russian-economy (www.cbr.ru/eng). This Central Bank is the main licensing authority for banks, insurance companies, broker-dealers, investment advisers, payment systems, *etc.* [7]. Since digital transformation significantly contributes financial sector globally, like in many countries, banks and other credit institutions in Russia are taking absolute advantages. The current ongoing Russia-Ukraine war has been positively influencing the growth trends of digital-banking usage in both countries (www.cbr.ru/eng).

With this progression, since the beginning, financial institutions have been facing greater competition and more demanding customers that have facilitated today's fintech in Russia. It

has been constantly experimenting with adoption of modern technologies and business models in Russian-economy. This makes sense when we raise question how attractive the customer base of digital transformation, especially, digital banking in Russia where there is currently internet penetration rate is 76 percent with more than 146.7 million citizens [7].

In this progression, the Deposit Insurance System (DIS), adopted by the Russian Federation in late 2003, was a significant development (www.cbr.ru/eng). It was certainly not a novelty by international standards [8]. This mandatory Russian DIS was established by the Federal Law Nr. 177-FZ of December 23, 2003 (www.cbr.ru/eng). The objectives of the DIS were in threefold: i) protecting the rights and legal interests of depositors, ii) strengthening public confidence in the Russian Federation's banking system, and iii) re-intermediating savings by the population into the domestic banking system. Another objective of the law, albeit not explicitly mentioned, was the need to enhance competition by creating a level playing field between state-owned banks and private-sector credit institutions [7, 8].

However, Russian DIS failed to ensure customer's total risk-free digital-transactions in digital-banking [2, 7]. Today digital-customers face perceived-risks no matter where they reside even though here over 76 percent of its population use internet services [1, 9]. Also, on this aspect, Russia does not have strict laws or approach(s) that can marginalize the magnitudes of "perceived risk" [2, 7].

Statista Research Department's data statistics (2022) [3] shows that over three months period (July to September of 2021), the value of unauthorized bank transactions that were made *via* remote banking services for physical entities in Russia amounted to nearly 1.7 billion Russian rubles. The fraudulent transactions conducted using ATMs and payment terminals were worth approximately 463 million Russian rubles [3]. However, in same time-period, the numbers of "unauthorized transactions" and "fraudulent transactions" in e-banking were extremely low in many countries including the USA, China *etc.* [3]. It puts the Russian-economy at the frontline when it comes impacts of perceived-risk-factors (PR) PR in today's digital-banking service-world country-wise.

Addressing the issues, *Voluntary Insurance* (VI) as a new product in digital-banking-world was first proposed in literatures by Akim Rahman [10, 11]. Underpinning Akim's model, relevant policy designs including reasonable cost or price setting of insurance can ensure risk-free digital banking. On the same token, it can open doors for *entrepreneurs* that can have VI as a new product in operation. The future digital finance will lead major changes in business arenas as well as in human behaviors no matter where we reside. Thus, policy design including setting cost or price(s) of *Voluntary Insurance* can be a crucial eventually. Accordingly, it warrants policymakers' attentions in Russia for adopting the proposal sooner than later. This study aims to use welfare analysis for policy-guidance on achieving beneficial social & economic outcomes for Russian society. So that policy-practitioners in Russia can be inspired for VI product or policy-adoption. Thus, this study proceeds with three specific objectives as follows:

(1) To attract Russian policy-practitioners' attentions adopting Akim' s model – *Voluntary Insurance* (VI) in digital-banking services in Russian-economy.

(2) To examine the profitability of adopting voluntary insurance as a product in digital-banking of Russian-economy under welfare analysis.

(3) To hint on setting cost / price of VI-product in Russian-economy under welfare analysis.

(4) To layout foundations on how to apply or utilize economics tools, *especially*, welfare analysis where the policy has not yet been in practice.

2 Literature review

2.1 Survey on creditable sources on the topic

Perceived security is a belief that suggests that the online vendors will fulfill the security requirements such as authentication, integrity, encryption, *etc.* [12]. Accordingly, monetary transactions such as mobile banking require a wide range of security measures and security assurance, which have become increasingly more important with wider use of mobile banking services [13]. In terms of e-commerce, the perceived protection of confidential information is the perception of consumers regarding the extent to which the online vendors protect their private or personal information. This means that consumers will perceive greater risk if a system for protection of confidential information is not well-established by the vendors [12, 14].

On these security-issues in digital-banking, Russian-economy is no exception where besides traditional banking; Yandex Money, MTS-Money, Fancy, Megafon, Yandex and Mobile Wallet, *etc.* are new ways financial services [1]. Today digital banking is an important product in financial sector without boundaries. However, it is characterized by evolving many factors that are often unpredictable [10, 11, 15]. It faces serious pitfalls being it riskiness. Customers compete

for time-saving options. Banks compete for marginalizing its operating costs then enhance its revenues. Most cases, customers do not read terms & conditions of services and they do not save contract-copy. These weaknesses cause abuses. Customer faces perceived risk such as hidden charges, *extra* fees, account hacked, *etc.* [4, 5, 10, 11]. It is well recognized in literature that the "perceived risk" is having a significant negative and direct effect on adoptions of digital-banking services [10–12, 16–18].

Addressing the digital *dilemmas* in financial sector globally, the application of Akim's model – *Voluntary Insurance* as a product of banks sector in operation [10, 11] can be a win-win to parties involved. This addition to behavioral intention theories in literature, *especially*, literature in subject area of *entrepreneurship and innovation management* is now well recognized [5, 19].

However, relying on extensive Website navigations as of today, it would not be overstated that no bank or banks sector of a country or countries globally has yet introduced *Voluntary Insurance* protecting digital-banking services [19]. In this aspect, Russia is no exception. In today's world, governments in almost all countries want to see effective utilization of technology facilitation in multi-faucets within its nation and beyond for greater interest of human society. Since year 2003, major Russian banks were openly appearing to be ready to embrace digital as a potential solution for maintaining and shoring up both revenues and relevance (www.cbr.ru/eng). Here Russia is categorized as a fintech-friendly jurisdiction with no unusually burdensome requirements on companies involved in this field of commerce [7]. In practice, the main regulator, the Central Bank, has also demonstrated an open-minded approach towards new financial technologies and maintains an informative website in English (www.cbr.ru/eng). In aim to a make a strong and secured digital services in Russian-economy, interested parties can engage with regulators in multi-faucets. Interested parties may engage with the regulator in many forums [7]. They are: Finopolis, an annual fin tech conference organized by the Central Bank in Sochi, the Association for Financial Technologies Development and in various smaller working groups (www.cbr.ru/eng).

There are some obstacles and uncertainties on security issues of digital banking that may impact certain business models, but it is expected to be changed soon because of recent efforts aimed to upgrade Russian regulatory framework for efficient digital economy [7]. It is also clear, big banks in Russia now lead the innovation race by leveraging existing relationships and data about their customers. For example, the largest banks are building their own financial marketplaces and *peer*-to-*peer* lending platforms. However, there are also many smaller companies and start-ups that are trying to challenge incumbents, especially in such areas as point-of-sale technologies and payment solutions [2].

Customers' bank accounts in many countries are insured by nation's Central Bank. For example, in Bangladesh, bank depositors' deposits are insured under "Bank Deposit Insurance Law, 2000". However, this kind of provision country-wise does not cover banking transactions no matter whether they are big banks, regional and community banks, commercial banks, credit unions and credit cards (Future digital finance, 2020). On this issue, banking provisions of Russia is no different. The provision of the deposit insurance system in Russian banking system covers bank account, and bank deposit [8]. However, it does not cover digital transaction, which faces perceived risk such as psychological, social / privacy, customer dispute and time value, technological interruption, *etc.*

Thus, efforts for inspiring policymakers in Russia for designing public policies are needed. So that banks sector becomes obligated adopting *Voluntary Insurance* policy in digital banking services for ensuing risk-free digital transaction. This study takes on the tasks by laying out the foundations of adopting the model – *VI* product for ensuring risk-free digital-banking in Russian-economy. It then spells out expected beneficial social and economic outcomes for both customers and banks using welfare analysis. So that it becomes appealing to policy-practitioners adopting VI product or policy in e-banking services in Russian-economy.

2.2 Elaboration of the concepts

For further clarity, this section elaborates concepts including VI product as follow

2.2.1 Digital or e-banking: What is it?

In today's world, digital banking is a combination of online banking and mobile banking.

In other words, Digital banking = Online banking + Mobile banking. Customers can manage bank accounts, transfer funds, deposit checks, and pay bills, *etc.* by using online banking. Most banks and credit unions, beside traditional, let customers access their bank accounts *via* the internet.

Like in many other countries, Mobile-only banks in Russia are revolutionizing personal banking, offering an alternative to traditional brick-and-mortar banks with fast, secure, and easy to use apps for iOS and Android. Mobile banks offer competitive banking services such as current accounts,

savings accounts, loans, insurance, and debit/credit cards, often at a cheaper rate than traditional banks. These mobile-only banks, also known as challenger banks, should not be confused with an online account from traditional bank. It is 100% app-based, offering more transparency and convenience with fewer restrictions and waiting times than common banks.

In Russian-economy, mobile banking typically operates across major mobile providers through one of two ways: SMS messaging and mobile web. It is like online account access from a home-based computer. This option allows for checking balances, bill payment and account transfers simply by logging into the user's account *via* a mobile web browser or by dialing targeted phone numbers. Here banks sector is operated providing services in multi-faucets meeting customers' needs. Besides bank branches, Tinkoff, VTB, Lockobank and Sberbank, *etc.* in Russia are the *latest* of the progression where customers use them for banking-services no matter where they reside (www.cbr.ru/eng). These financial-service providers here act as a catalyst for economic development of unbanked population by providing prompt, fast and safe banking products, and services. Customers here enjoy user-friendly setup compared to that of other kind digital-banking option.

2.2.2 Perceived risks in digital-banking services

The "risk" concept is shaped around the idea that customers' behaviors involve risks in the sense that any customers' actions may create consequences that they cannot anticipate anything approaching with certainty [20]. "Perceived risk" is powerful in explaining customers' behaviors because customers are more often motivated to avoid mistakes than to maximize utility using e-banking [4, 10, 11, 19]. Risk is often present in choice-situation as customers cannot always be certain that a planned-use of e-banking will achieve absolute-satisfaction. Online shoppers perceive greater risk when paying online-bills even though goods are non-standardized and often sold without warranties [10, 11, 21, 22]. Underpinning this reality in today's competitive markets, perceived risk is regarded as being a composite of several categories of risks. In literature, several types of perceived risks have been identified in e-banking services [17, 19, 23].

The distinct types are perceived risk factors are as follows: (1) Psychological risk; (2) Trust factor; (3) PIN fraud risk; (4) Security / privacy risk; (5) Financial risk; (6) Performance risk; (7) Customer dispute; (8) Social risk; (9) Time risk.

2.2.3 Lessons-learnt

In literature, on customers' preferences, a comparison-study in Bangladesh-economy, between mobile-led and bank-led options was carried out by Akim Rahman [19]. It is assumed to be served as *lessons-learnt* for better understanding of factors that has resulted a higher trend of bKash (mobile-led) usage over bank-led usage digital in Bangladesh.

There are more than thirty million customers who use bKash for digital-transactions and accordingly there are over 0.2 million agents located around Bangladesh (The Daily Star, 2021). Here trend of bKash-users has been growing geometrically. However, trend of bank-led-users has been growing *mathematically* – very slowly in city areas & it would not be overstated claiming it does not exist in rural areas, even though bank-sector promotes it desperately curtailing the magnitudes of its operating cost [19]. For clarity on whether perceived risk factor has overall played significantly undermining the growth of the trend of bank-led digital-banking, the author used a comparison in Table 1.

Table 1 Position in consumer's preferences mobile-led (bKash) vs. bank- led "Digital-banking". (Source: Rahman (2020) [19])

Determinant	b-Kash	Bank-led
	Position	Position
Confirmation by making phone call (s)	1st (+)	1st (–)
Perceived risk factors		
Psychological risk	4th (+)	4th (–)
Privacy risk	2nd (–)	2nd (+)
Financial risk	3rd (–)	3rd (–)
Performance risk	6th (+)	6th (–)
Social risk	5th (+)	5th (–)
Access / Familiarity with Internet	2nd (+)	2nd (–)
Convenience for transaction	1st (–)	1st (+)
Bonus for digital banking	1st (–)	1st (+)
Confirmation *via* SMS	1st (+)	1st (+)
Focus option (phone call confirmation)	1st (+)	1st (–)
Focus of comparison effects	1st (+)	1st (+)
Know-how-skill	1st (+)	1st (–)
Self-image	1st (–)	1st (+)

In Table 1, the serial number or position of the factor in contribution reflects customer preferences in choosing bKash or bank-led digital banking in Bangladesh-economy. Here positive (+) sign means "positively influences" and negative (-) sign means "negatively influences" the choice of bKash or bank-led digital banking when a customer is decided for e-banking. It further shows mobile-banking is more appealing than that of bank-led digital because of perceived risk (PR) issue, which raises question: what is VI and how can it be instrumental?

2.2.4 Voluntary Insurance

Addressing issues of perceived risk-factors that undermine the growth trends of e-banking in economy country-wise, Voluntary Insurance (VI) as a product of digital-banking has been proposed by Akim Rahman in literature [10, 11]. The financial sector can introduce it as a product in operation where bank or third-party can collect premium ensuring secured services. The way it would work is that customer's participation will be voluntary. Insurance will be attached to customer's account, if and only if, customer wants it for digital services. Since the program will be designed in a way of transferring the risk away from its premium-payers, it will ensure premium-payers with a sense of certainty. Here premium-receivers will take extra measures for ensuring risk-free digital-banking services. For example, Credit Cards, Bank Cards, *etc.* can be protected by setting two identifications such as password and a finger-scan. Suppose a customer wants to use credit card where to access his account, the customer will have to use two identifications namely own setup password and previously chosen finger-scan say his thump or forefinger scan. Here finger scan in addition to password can be connected to the card system, which will make digital banking to be enhanced secure. Overcoming the risk of heist or hacker's access, under the proposal, similar own set up identifications can be used. In global banking cases such as remittances, the program can ensure risk-free digital banking.

Here VI is proposed as a new product in e-banking services where perceived-risks play an influential role in setting the stage for the VI usage in e-banking services. It is palatable assuming that e-banking-customers are risk-averse, *i.e.*, they prefer certainty to uncertainty when it come banking and the proposed VI can ensure the certainty. That raises question: how the VI product would work?

On answering "how the VI product would work?" this section begins with by establishing the basis of the model VI in Russian-economy. It uses the Theory of Consumer Choice & Behaviors [5]. Figure 1 illustrates the risk preferences of a risk-averse banking-customer.

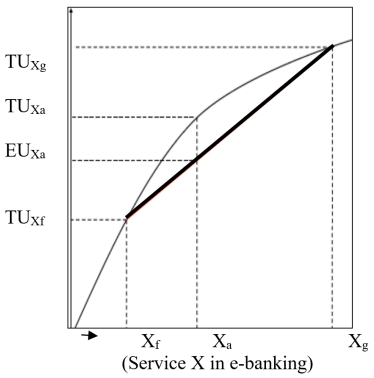

Figure 1 Risk aversion *scenario* [5]

In a world of uncertainty, a customer's actual utility that he receives from digital services will never fall on the TU (X) but rather on the chord (the bold line) as shown in Figure 1. X_g, in Figure 1, represents a service outcome in which customer may use a certain level of service X while X_f represents a negative outcome in which customer may use less of service X. If there is a level of uncertainty that a customer may not use X_g units of service X, the utility that this customer receives will lie somewhere on the chord (the bold line). The chord represents the expected utility (EU) of using service X, which lies in the concavity of the curve because it is the average probability that the customer will use service X or not. As a result, an individual will never receive TU (X_a) but EU (X_a).

3 Why Russia?

Banks play a predominant and interventional role in Russian-economy and its decisive inputs in payment-systems and in money and capital markets is evidence of a growing and smoothly operating economy [2]. Here the development of the economy is dependent on the stability of the

banking and financial system like any other countries. In support of DIS provision in Russian-economy, it was promoted that the DIS provision would facilitate (i) greater public confidence in financial institutions (ii) the need to protect small depositors and (iii) the benefits of leveling the playing field between the different classes of banks, particularly private and public, thereby bolstering competition in the financial sector (www.cbr.ru/eng). However, aside from real or perceived benefits of the DIS, there was increasing awareness of its direct and indirect costs. Specifically, these costs may evolve in multi-faucets such as i) moral hazard ii) perceived-risk and iii) potential destabilizing effects resulting from a change in incentives on the risk-appetite faced by shareholders, bankers, depositors, and other creditors [24].

Digital Transformation is no longer a buzzword in world-economy country-wise. It is the profound transformation of business processes, competencies, and models to fully leverage the changes and opportunities of digital technologies and their impact across society, in a strategic and prioritized way. Accordingly, national Digital Strategy has been recently designed in Russia. Although it was not one of the government's priorities up to now, the private sector has been trying to get on the train of digitalization and cultural shift as soon as possible (www.cbr.ru/eng). Succeeding in this task is far more than crucial. It is the only way to future development.

In Russian-economy, fin tech companies provide financial services using big data, artificial-intelligence (AI), machine learning, robotization, blockchain, cloud technologies, biometrics, *etc.* Here the business models range drastically from traditional payments and collective investments to such novel areas as crypto currencies, initial coin offerings (ICOs) and robo-advisers. Each business model is always subject to its specific set of regulations and licensing requirements. Given this fact, there is no universal fin tech license in Russia. Instead, each business model of fin tech is regulated separately. Some business models, such as payments, are subject to established regulations that were adopted several years ago, while many others are subject to no regulation at all or operate in the grey area of the law [7].

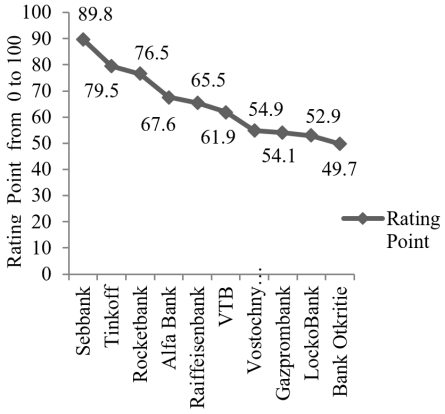

Figure 2 Ranking of best mobile banking applications in Russia in 2019

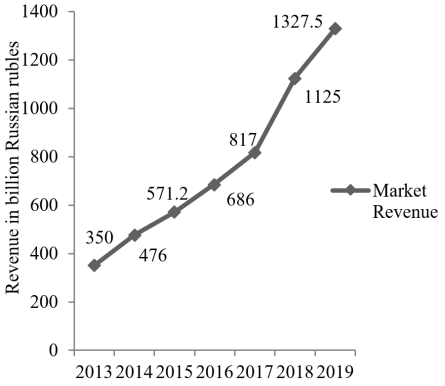

Figure 3 Annual revenue of online payments in Russia from 2013 to 2019

Figure 2 and 3 show recent years digital-banking usages penetration in Russian-economy. Figure 2 shows that the Sebbank dominates the market. Figure 3 shows that the trends of market-revenue progresses were steady fast from year 2013 to 2019. Here the amount of individual bank accounts with the ability of the distance access through mobile devices increased more than by 20 times [1]. Every year increased banks start to offer mobile banking services. Despite this, the popularity of mobile banking applications is lower than the popularity of other banking services. Thus, the problem of mobile banking adoption by customers is still an important problem where perceived risk-factors dominate the issue [1].

Despite rapid growth of digital-banking in Russia, there is no insurance policy that covers PR, which is very often faced by customers in Russian-economy. In other words, digital-banking face serious pitfalls being it riskiness in Russian-economy [1,2]. Figure 4 shows that over three months' time-period, July to Sept of 2021, the impact of PR in e-banking was declining compared to that during same time-period in year 2020 in Russian-economy [3].

Here the value of unauthorized bank transactions that were made *via* remote banking services for physical entities in Russia amounted to nearly 1.7 billion Russian rubles. Fraudulent transactions conducted using ATMs and payment terminals were worth approximately 463 million Russian rubles [3]. Since the ongoing Russia-Ukraine War has been influencing growth trends of e-banking uses meeting the consumers demands in both countries, it is palatable that the impacts of the PR have been growing too. In other words, digital-banking faces serious pitfalls being it riskiness in Russian-economy [1,2].

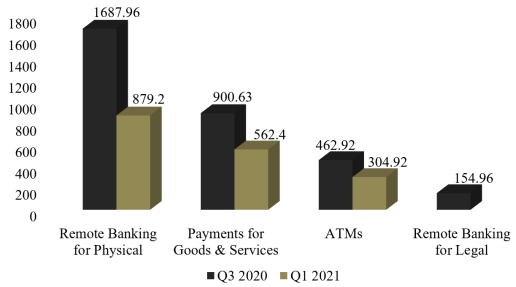

Figure 4 Value of unauthorized bank transactions in Russia in 3rd quarter 2021 2021 (Source: Statista Research Dept, 2022; www.statista.com)

Figure 4 clearly shows that e-banking customers severely face the impact of perceived-risk. Dealing with the determinant "perceived risk", application of Akim's model *Voluntary-Insurance* [10, 11] can be instrumental in Russian-economy, which deserves policymakers' attentions. This study puts forward efforts for that.

4 Prospects of the VI in Russian economy

Once policy-practitioners recognizes the importance of the proposed VI product under Akim's model and introduce banking-provisions that authorize the VI as a new product, it may be spread from bankers to customers in Russian-economy. This process of life cycle of the VI product can be described using the "S-curve' or diffusion curve. This S-curve maps the growth of revenue or productivity against time. In the early stage of this progression, growth is slow as the new product establishes itself. At some point customers begin to demand and the product growth increases more rapidly. These new incremental changes to the product will allow the growth to continue. Toward the end of its life cycle, the growth will slow down and may even begin to decline. In later stages, no amount of new investment in that product will yield a normal rate of return. However, it will establish a secured bank-led digital banking through the bankers who introduce this new product, It can present a Cashless Russian-society sooner than delaying.

This successive S-curve will come along to replace the traditional banking and will continue to drive growth upwards where the VI is likely to have "product life" *i.e.*, a start-up phase, a rapid increase in revenue and eventual decline. But it will never get off the bottom of the curve and will never produce normal returns. In this progression, it will play important roles presenting a secured bank-led digital-transaction system, which is mostly needed to attract today's probable customers.

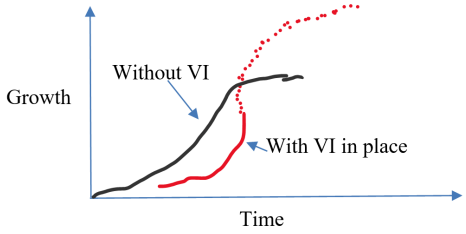

Figure 5 Probable impact of VI in Russian-economy through e-banking services

Overall, this progression will welcome cashless society sooner than delaying in the economy country-wise (Covergenius.com, 2022). In Figure 5, the first curve shows a growth evolved from today's mixed of traditional & digital banking services in Russian-economy. The second curve shows, with introducing VI in digital-banking services, that currently yields lower growth but will eventually overtake the current growth rate and lead to even greater levels of growth. When time comes, this progression of digital-banking arena in Russian-economy will be an example in world-economy where country-wise economy may follow Russian's footstep when it comes efforts for digital-banking progression. Accordingly, someday world-economy can present cashless human-society.

5 Application of Akim's model

For guidance in policy design – adoption of the VI policies including assessing amount of cost or prices of VI policy or product, this study carries out Welfare Analysis of the application of VI model in Russian Digital-banking system. With fewer assumptions about the underlying primitives, this study imposes enough structure to allow meaningful welfare analysis. These

fewer assumptions come at the cost of limiting the welfare analyses to only those associated with the probable pricing or cost for the VI. It begins by showing how standard consumer and producer theory, in microeconomics, can be applied to welfare analysis of probable VI market with selection [25, 26].

Since welfare analysis requires knowledge on how demand varies with price and how information changes the price, which affects the costs of insuring participants, this study uses these insights to provide a particular graphical representation of welfare cost of inefficient pricing arising from selection. These graphs can be viewed as it is providing helpful intuition as follows

Besides other things, the graphs illustrate how the qualitative nature of the inefficiency depends on whether the selection is adverse or advantageous. In adverse-selection cases, inefficiency is the outcome of market failure because of asymmetric information. This uneven knowledge causes the price and demand for services in a market to shift. So, accurate information is essential for sound economic decisions. But the adverse-selection group will take preventive measure protecting the account. In advantageous-selection cases, since the account is insured, e-banking account-holder will not be enthusiastic taking preventive measures to protect the account, which causes welfare losses.

In aim to examine the benefits or profitability of bank(s) that adopts the VI in economy country-wise such as Russia, this section is designed as follows.

It is important for customers as well as for banks to get full information about the economic benefits of adopting VI in digital banking-services. This is because the insurance *premium* will go out from customer's pockets. In returns, it ensures a safe & secured digital transaction where VI destabilizes all risk including perceived risk factors. Thus, customers can be risk-free. Since individual here requires directly spending money, risk-adverse may not choose insurance in his or her preference. It is like some people may not choose even traditional banking because of the bank-account fees, bank charges, *etc.* in general no matter where we reside in the globe.

5.1 Model

5.1.1 Setup & notation

First of this study considers a situation in which customers of digital-banking are faced with choices: i) signing up for insurance contract or not signing up offers high coverage say contract H ensures risk-free digital-banking ii) Not signing up for insurance offers *i.e.*, no coverage say contract L, but the contract facilitates digital-banking services.

To further simplify the exposition, we assume that contract L is no insurance, but customers are facilitated for free access to digital banking. And contract H is full insurance and customers are facilitated digital-banking services. These are merely normalizations and straightforward to relax where once the VI policy is in place, bank (s) can handle the insurance matter just like it handles its customer account maintaining fees with the bank.

Another important assumption is that we take the characteristics of the contracts as given where premium of insurance to be determined endogenously. It is a reasonable characterization of many insurance markets with variation across individuals only in the pricing of the contracts and not in offered coverage. This analysis is therefore in the spirit of Akerlof (1970) [25] rather than Rothschild and Stiglitz (1976) [26] who endogenous the level of coverage.

5.1.2 Demand for insurance

It is assumed that each customer of digital banking makes a discrete choice of whether to buy insurance or not. Since we take as given that there are only two available contracts for digital-banking services and their associated coverage, demand is only a function of the relative price p. It is assumed that banks cannot offer different prices to different customers. To the extent that banks can make prices depend on observed characteristics. It is assumed that if customers choose to buy insurance, they buy it at the lowest price at which it is available. So, it is sufficient to characterize demand for insurance as a function of the lowest premium *i.e.,* price p. *Mathematically*, D = f(p) where D = demand for insurance and p = premium amount or price for insurance services. Since it will be mostly digital services, the price or premium amount will be small no matter where what economy we talk about.

5.1.3 Supply and equilibrium

Assumed that there are N $\geq$ 2 identical risk neutral insurance service-providers or banks in digital-banking cases that set prices in a Nash Equilibrium. There might have both imperfect and perfect competitions in market. But we choose to focus on the case of perfect competition as it represents a natural benchmark for welfare analysis of the efficiency cost of selection [22].

This analysis further assumes that when multiple banks set the same price, individuals who decide to purchase insurance at this price choose a bank randomly. It can also be assumed that the

only costs of providing contract H to individuals i are insurable total cost is TC. Here average cost (AC) curve is determined by the costs of the sample of individuals choose contract H. *Symbolically*, AC = TC / i where AC reduces as i increases (i = number of customers).

To characterize equilibrium, we make two further assumptions. First, we assume that there exists a price $\overline{p}$ such that $D(\overline{p} > 0$ and MC $(p) < p$ for every $p > \overline{p}$. In other words, we assume that it is profitable and efficient to provide insurance to those with the highest willingness to pay for it. Second, we assume that if there exists $p_{\_}$ such that $MC(p_{\_}) > p_{\_}$ then $MC(p) > p$ for all $p < p_{\_}$. That is, we assume that $MC(p)$ crosses the demand curve at most once. It is easy to verify that these assumptions guarantee the existence and uniqueness of equilibrium. In particular, the equilibrium is characterized by the lowest break-even price P^* = AC (P).

5.2 Measuring welfare

We measure consumer surplus (CS) by the certainty equivalent. The certainty equivalent of an uncertain outcome is the amount that would make an individual indifferent between obtaining this amount for sure and obtaining the uncertain outcome. An outcome with a higher certainty equivalent thus provides higher utility to the individual. This welfare measure is attractive as it can be measured in monetary units. Total surplus (TS) in the market is the sum of certainty equivalents for consumers and profits of the firm or bank that provided insurance. Throughout we ignore any income effects associated with price changes.

5.3 Graphical representation

With the above framework, a graphical representation of adverse-selection and advantageous-selection are shown as follows The graphical presentation facilitates for better understanding the efficiency costs or competitive prices of the VI in digital-banking services by incorporating customer-types in selection-choices of the insurance for ensuring risk-free digital banking. This individual-choice may someday present a cashless Russian-economy, which is a dream of today's Russian-society.

5.3.1 Adverse selection

In Figure 6, y-axis represents price or cost of contract H and x-axis represents quantity *i.e.*, share of individuals in the market with contract H where maximum possible quantity is denoted by Q_{max}. The demand curve denotes demand for contract H. Similarly, average cost (*AC*) curve and marginal cost (*MC*) curve denote average and marginal incremental costs to the insurer from coverage with contract H relative to contract L.

The key feature of adverse selection is that individuals who have the highest willingness to pay for insurance are those who, on average, have the highest expected costs. This is shown in Figure 6 by drawing a downward sloping MC curve, which indicates MC is increasing in price and decreasing in quantity *i.e.*, number of individuals. As price falls, the marginal individuals who select contract H have lower expected cost than infra-marginal individuals, leading to lower average costs. The essence of the confidential information problem is that the bank cannot charge individuals based on its privately known MC, but are instead restricted to charging a uniform price, which in equilibrium implies average cost pricing. Since average costs are always higher than marginal costs, *i.e.* (AC > MC), adverse selection creates underinsurance, a familiar result first pointed out by Akerlof (1970). This under-insurance is shown in Figure 6. The equilibrium shares of individuals who buy contract H is Q_{eqm} (AC intersects DD at point C). Accordingly, efficient number is ($Q_{eff} > Q_{eqm}$), this is because MC curve intersects DD curve.

In Figure 6, shaded area CDE shows the welfare loss due to adverse selection. This represents a loss of consumer surplus from individuals who are not insured in equilibrium because their willingness to pay is less than the average cost of the insured population. But it would be efficient to them to insure because their willingness to pay exceeds their marginal cost.

To evaluate and compare welfare under a different *scenario*, suppose digital-baking customers are mandated to sign up for contract H. It would generate welfare = ΔABE – ΔEGH. This can be compared to welfare at competitive equilibrium ΔABCD. In this *scenario*, welfare at efficient allocation is ΔABE and welfare from mandating everyone to sign up contract L (normalized to *zero*) or the policies subsidies or tax the equilibrium price. The relative welfare ranking of these alternatives is an open empirical question, which can be studied to assess welfare under alternative policy interventions (including no intervention option).

5.3.2 Advantageous selection

The initial theory of selection in insurance markets emphasized the possibility of adverse-selection, and the resultant efficiency loss from underinsurance 25,26. Consistent with this theory, many empirical analyses suggest that insurance markets such as health, the insured have

higher average costs than uninsured [27, 28]. However, in life-insurance market, there exists "advantageous-selection". Those with more insurance have lower average costs than those with less or no insurance. Cutler, Finkelstein, and McGarry (2008) [27] provide a review of the evidence of adverse and advantageous selections in different insurance markets.

The framework in this study, graphical presentation in Figure 7, makes it easy to describe the nature and consequences of advantageous selection. Here in *contrast* to adverse selection, with advantageous selection, individuals who value insurance the most are those who have, on average, the *least* expected costs. This translates to upward sloping *MC* and *AC* curves (Figure 7). Here source of market inefficiency arises because here i) Consumers vary in their marginal cost ii) Banks are restricted to uniform pricing and iii) Equilibrium price is based on average cost.

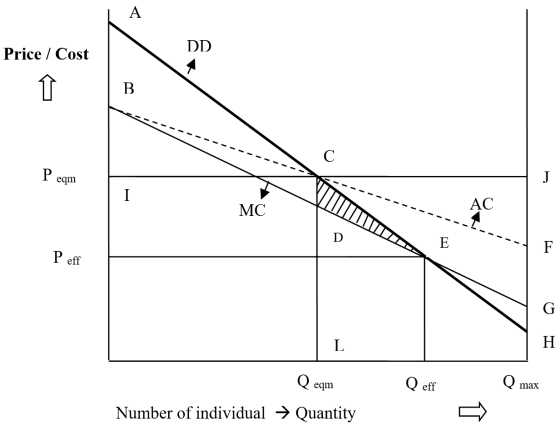

Figure 6 Efficiency cost of adverse-selection under VI Policy

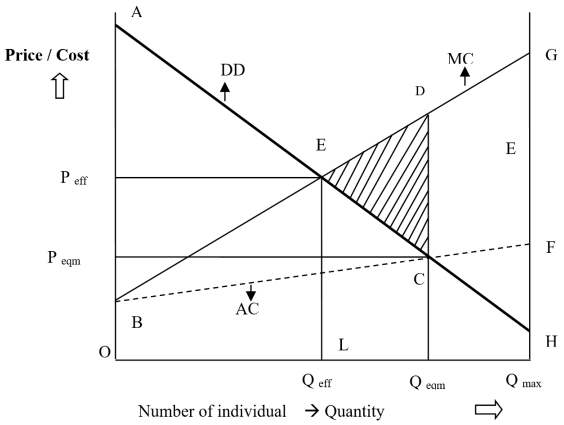

Figure 7 Efficiency cost of advantageous-selection under Voluntary Insurance Policy

However, with advantageous selection, the resultant market failure is one of over-insurance rather than under-insurance (*i.e.*, $Q_{eff} < Q_{eqm}$ in Figure 7), as pointed out by de Meza and Webb (2001) [28] in their study. In general, insurance providers have an additional incentive to reduce price, as the infra-marginal customers whom they acquire as a result are relatively good risks. The consequential welfare loss is given by the shaded area Δ CDE. It is resulted because of excess of *MC* over willingness to pay for individuals whose willingness to pay exceeds the average costs of insured population. In Figure 6, welfare can also be evaluated in other situations i) mandating contract H (Δ ABE - ΔEGH) ii) mandating contract L (normalized to *zero*) and iii) competitive equilibrium (Δ ABE - Δ CDE) and efficient allocation (Δ ABE).

5.3.3 Graphical presentation summary and future study direction

Analyses relate to Figure 6 and 7 illustrate that the demand and cost curves are sufficient information for welfare analysis of equilibrium and non-equilibrium pricing of existing contracts. In other words, cases of different preferences and confidential information can have the same welfare implications if they generate similar demand and cost curves. This is essential for carrying out empirical approach under welfare analysis, which can be a direction for future research in this study. Also, a test whether insurance premium has any impact on the probability of the VI policy adoption that influences digital-banking adoption in Russia, can be conducted as a future study.

5.4 Potential moral hazard and future study

Thus far any potential moral hazard effects of the proposal "voluntary insurance" have not been discussed. Underpinning our setup of welfare analysis in this study, moral hazard does not fundamentally change the analysis, but it can only complicate the presentation. We have defined contract H to be full coverage and contract L to be no coverage but signup for using digital-banking services on his or her own risk. Here, moral hazard has no effect on the welfare analysis.

Future study on moral hazard issue can be conducted by making slight modification allowing contract L to include some partial coverage.

5.5 How can the current effort be instrumental?

The current effort is to bring the issue to policymakers' attentions so that proposed new product can be introduced in digital-banking operation in economy country-wise such as Russia. This raises questions: how can this new product be instrumental to bank-sector and to society?

Answering the questions posed, it is palatable that transferring risk away from customers will directly benefit both bank-sector and bank-customers. It can further attract new customers who

were on the brink using digital banking but just felt it was risky. The model can facilitate the customers with incentives for increasing usages of digital-banking services while maintaining optimal utility of it. Furthermore, any new product, *obviously* legal one, is the lifeblood of business companies and societies. It can facilitate many ways such as: i) ensured new value for customers, ii) improved society and iii) continued existence of company in competitive market.

The *Voluntary Insurance* in place can ensure risk-free On-the-Go-banking, which can guarantee elevated self-service-banking activities in economy country-wise such as Russia. This can be beneficial to customers because it can ensure savings in the form of cost and time. Also, it facilitates a sense of relief of a user from psychological stress of perceived risk-factors in digital-banking services. Thus, customers will flock to it when they use banking services. By extra advancement of ICT usages, banking sector can be further competent cutting off its operating costs, meeting customers' needs and keeping up with global changes.

With this *win-win* setting for producer & customer (user) of the product in digital-banking, financial sector globally is no exception. To sail through tough competition and to sustain revenues, financial sector in many countries such as Russia are engaging more than that of other kinds of bank on adoption of IT in its operation [21]. However, it warrants for effective efforts on attracting more individuals as customers meeting challenges in case Russian-economy is moving for being "cashless society" in the future. Thus, findings can be a guidance for policy-practitioners' efforts for ensuring risk-free transactions of digital-banking services in Russian-economy so that the steady fast growth trends can be upheld. It can further be instrumental to digital-banking service-providers in market economy where future studies can be conducted in multi-faucets including empirical studies on "customers' opinions on how they prefer the VI.

6 Conclusion

Adding VI, a new product in digital services, can be impetus meeting today's challenges. This new and increasing value can keep banks or firms be growing, which can facilitate further booming Russian-economy. If there is no new value to offer customer, banks or firms wilt and eventually die-down. Thus, policymakers of Russian Federation can play role for better-ness of its modern-society when it come e-banking services. Bank Laws in Russia contains multi-faucets provisions. The adoption by the Russian Federation of a deposit insurance system (DIS) was a significant development. It covers bank-deposits, bank-accounts. But digital transactions are not insured in Russian-economy. In practice DIS intervenes to ensure that depositors do not suffer a loss if they file complaints. Despite rapid growth of digital-banking globally, no country has insurance in place to cover digital-transaction. But e-banking faces serious pitfalls being it riskiness. Customers do not read terms & conditions of services. These weaknesses cause abuses. Customer faces multi-faucets perceived risks. Application of Akim's model – the VI, a new product in banking-services, can be impetus for policy-design meeting the challenges. Welfare Analyses are used as guidance for ensuring efficiency cost or competitive pricing of the VI so that it becomes appealing to parties involved. In a *scenario* where bank serves as an insurance-provider, the existence of adverse-selection group is detected where the estimated welfare cost associated with inefficient pricing created by the adverse-selection is quantitatively small with asymmetric information. However, the advantageous selection group in this insurance market results the opposite. Findings can be helpful in policy design ensuring risk-free transactions of digital-banking services in Russian-economy so that the steady fast growth trends can be upheld. Future studies can be conducted in multi-faucets including empirical studies on "customers' opinions on how they prefer the VI in digital-banking services.

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REVIEW

Pitfalls on strategy execution of an organization: A literature review

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Abstract: The purpose of this study is to explore the pitfalls on strategy execution of an organization as organizations often unable to meet objectives and most likely fails, and this is normally attributed due to the inefficiency on the strategy implementation process. To address this gap, the research employed a deductive approach with exploratory research design by focusing on qualitative data as a systematic review of theoretical and empirical studies are more vital for this type of research. The study focused on a systematic literature review (SLR) of 22 peer-reviewed theoretical and empirical studies. By using a review and generalization of the existing approaches followed by synthesizing with relevant model portrayed organizations seriously faced a challenge on implementation phase and the inability to properly address the pitfalls on strategy execution process costs a lot especially to senior and top executives as they are primarily responsible for the successful execution of an organization strategy. Hence, organizations shall establish a clear evaluation system and sense of ownership for successful implementation of a strategy. As a future direction the paper also identified that a more in-depth and field work research in an organizations are vital in order to examine and address the challenges on the implementation phase.

Keywords: pitfalls, strategic management, strategy formulation, strategy execution, strategy evaluation

1 Introduction

Though it is not uncommon to see an organization that engaged on strategic planning process, the great challenges coming on is the implementation part which refers to as strategy execution. Scholar's pointed out that strategy is a pillar and a driving force for an organization that leads to success, able to satisfy the volatile of customers' needs and use to maintain competitive position in the market despite the failures being unresolved. Though, strategy implementation is being the most central point and critical stage in the planning process, it is indispensible that almost all organizations that formulated a strategy plan has a difficulty of at least once in a month getting initiation to talk about execution of strategy and evaluating how implementation process is going on. Despite a great number of scholar's being estimated the percentage rate of failure in implementation process, as Candido et al. (2019) [1] pointed out that a failure in strategy implementation is estimated between 30% and 70% and the researcher of this article found out this can be considered as a big loss and by itself which requires an intensive study to prove it.

On the other hand, though organizations have all adequate resources (financial and non-financial), technical and managerial skills or capability at hand, unless they would properly exert their effort to execute the strategic plan document, there is a great chance of failures on implementation process and it is a normal scenario to reason out for the possible challenges or problems in strategy execution. This related mostly to lack of a general framework to implementation process. The idea is also underpinned by scholar's views that even if strategic planning is an involved, intricate and complex process that takes an organization into uncharted territory, it does not provide a ready-to-use prescription for success and hence it is likely to face potential pitfalls on strategy execution process [2].

The purpose of this study therefore was to conduct a systematic review of literatures that point out the pitfalls on strategy execution process and thereby addresses the research problems or gaps and meets objectives. Hence, based on this the article is first organized on assessing the related works; like, on review of theoretical, empirical study and then developed a conceptual model, then the methodology part is elaborated followed by a result, discussion and finally a conclusion and future direction is framed.

1.1 Research objective

The objectives of the study include assessing the strategic making processes, and identifying the pitfalls or challenges on the execution process.

1.2 Research questions

(1) Do organizations have a mechanism to properly evaluate the implementation of strategy? (2) What are the pitfalls in strategy execution of an organizations and how to overcome it?

2 Theoretical review

Literature review is the milestone or the backbone for every type of research to undertake as without a theoretical background the researcher assumed to be just a ship in big ocean without a compass. In this regard scholar's like as Creswell (2009) [3] states "one component of reviewing the literature is to determine what theories might be used to explore the questions in a scholarly study." Based on this notion the concepts that related to this topic are put forward.

2.1 Making a strategy

Theories and empirical review elucidated that the making of strategy is not an easy task as the success or failures in implementation would arise from exhaustive formulation of a strategy. Hence, to identify the shortcoming in implementation the researcher believes that reviewing the essence of strategy and strategic management process have to be an imperative task.

Theoretical research portraits the word 'strategy' is derived from the Ancient Greek 'strategía' or 'strategike'. It was used inconsistently, sometimes meaning ruse, sometimes 'the art of generalship', especially in the definition of the East Romans (Byzantines) [4]. The author also noted that strategy is initially and widely exercised in military activities as strategizing all resources would be considered a techniques to won in battle field. Another definition reveals "strategies are the means by which long-term objectives will be achieved" and it requires the potential actions of senior management for taking decisions and use of large amount of resources [2]. When we say strategy it is a way to reach some points that predetermined a head of time. In this respect, according to Armstrong (2006) [5] "strategy is about deciding where you want to go and how you mean to get there." It is intent of declaration. It is about what we want to do and how we intend to achieve it. Normally it is a longer-term goal but more importantly it focuses on how it can be achieved

"Strategy is often a blueprint, a design of how to build something or make something happen." (Stump & Mullen, 2014: 46). Besides as Hitt et al. (2009) [6] states "strategy is an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage."

Strategy is also associated with the plan, scope, directions, set of ideas, conception, intentions, prospects of an entity, internal regulations, guidance and actions that deals about how to achieve results by using the available resources [7]. According Jofre (2011), "strategies are a combination of deliberation and impulsiveness on the base of new and past ideas and actions". Besides, as M. Porter recently addressed to CEO of big companies in one international forum in India, Mumbai that "strategy cannot be a popularity contest where everyone gets a vote because the essence of strategy is about choices," and in addition to that he remarks "though formulating a sound strategy sounded simple, in reality, it was not" [8].

The author of this article found out that though scholar's explanation and definitions about strategy are enormous that contributed for accomplishment of organization goals in practice strategy still remains as a roadmap for organizations to reach a desired level, despite pursuing the steps to reach the ultimate goals or objectives continue as devastating tasks which normally called as challenges or failure in strategy implementation. From this notion, despite many enterprises are operating there business or functions without a formal strategic plan, at the end of the day they would face a threat that led to instability and failures in organization.

Hence, from the theories outlined above the author of this article induced that though organizations have a good strategy to meet future objectives, coordinating and mobilizing all resources for successful implementation has to be a more demanding task or jobs especially to managers or top executives. Once, we do understand about the notion of strategy the most prominent step is getting a clear and workable practice or developing of strategic management which systematically reviewed as follows.

2.2 Strategic management process

Despite the fascinating theme of strategy remains a hot issue in this 21^{st} century, there needs more research and working with respect to strategic management process, especially to implementation aspect and hence, to dig out the reason for failure in implementation process, the author of this study focused to review scholar's contribution on strategic management.

The strategic management process does not get involved in the day to day running of the organization's operations, but instead creates the strategies for the accomplishment of Long

term objectives. However, to attain this objectives a holistic approach of an integrated strategic management process requires, in this regard some scholars pointed out the strategic management process involves four stages and the other scholar's identified as there are three stages in which by taking environmental scanning into strategy formulation steps. Accordingly, Zafar et al. (2013) [9] there are four key elements to strategic management; like, environmental scanning, strategy formulation, strategy implementation, evaluation and control which stated below.

As David (2011) [10] stated "strategic management allows an organization to be more proactive than reactive in shaping its own future" which able an organization to initiate and influence than responding to activities that able to exert control over its own destiny. Besides, the great point which raised by the author that really most small business owners, chief executive officers, presidents, and managers of many for-profit and nonprofit organizations have recognized and realized that the benefits of strategic management has been indispensible.

"Strategic management is the art and science of formulating, implementing, and evaluating cross-functional decisions that enable an organization to achieve its objectives." Strategic management is not only to meet objectives but eventually it is about maintaining a competitive position in the market as it needs a holistic approach of integrating different functional units or departments towards successful accomplishment of strategic plan [2].

Besides, accordingly to Hitt et al. (2009) [6] stated that "the strategic management process is the full set of commitments, decisions, and actions required for a firm to achieve strategic competitiveness and earn above average returns." Besides the role of management bodies also vital on strategic management process and as Okpara (n.d.: 2) [11] dictates "management must create tomorrow through strategic management to maintain the organization as a "going concern" and for continuous improvements in the operations of the organization and its relevance in the marketplace. From the above notion, the researcher of this study pointed out that for successful implementation of strategic management it needs a holistic approach of an organization; especially, the roles of management bodies are prominent in such a way that they would able to create an integrated approach and systematic evaluation of strategic management process that drive them to proactively take appropriate measure before failures come after.

The literature reviews indicates evolving the strategic management process has to follow certain major steps; like, environmental scanning, strategy formulation, implementation and strategy evaluation, though the purpose of this study was to review the challenges on implementation step. According to Hitt et al (2009) [6] 'the firm's first step in the strategic management process is to analyze its external and internal environments to determine its resources, capabilities, and core competencies— the sources of its strategic inputs. With this information, the firm able to develop its vision, mission and formulates its strategy.

Hence, the author tried to systematically review each steps from the perspective implementation phase.

2.2.1 Environmental scanning

Environmental scanning is a process of evaluating the environmental factors at macro and micro level in order to identify the organizational threats and opportunities. A sound and a great strategy formulation begin with these scanning processes in which eventually leads to best strategic selection and successful implementation process. Thus, the environmental scanning is divided into:

External Environmental Scanning

External environmental scanning is very important for any organization. Sometimes, the sudden change in the corporate environment sector or an economic crisis may prove fatal for an organization. Over the years many models have been evolved for analyzing the external environment. Normally, the external environment is ascribed by SLEPT/ PESTEL Analysis; such as, Social, Legal, Economic, Political, Technological Environmental analysis. Though the interpretation and uses of these factors differ from country to country, company to company, some of the common variables in these factors are as follows:

(1) Political factors refer to, political stability and security issues, government policy, tax policy, foreign trade policy, corruption, labour law and trade restrictions;

(2) Economic factors include economic growth, inflation rates, interest rates, exchange rates, unemployment rates, disposable income of consumers and infrastructure facilities;

(3) Social factors refer to income distribution, population growth rate, age distribution, career attitudes, safety emphasis, health consciousness, lifestyle attitudes and cultural barriers;

(4) Technological factors include automation, level of innovation, research and development, awareness to technology;

(5) Environmental factors refer to weather, climate change and pollution effect;

(6) Legal factors include health and safety law, antitrust law, employment law, copyright and

patent law and consumer protection law.

This research figured out that an assessment of those external factors have to be completed when once it inextricably intertwined with internal environmental assessment of an organizations as at the end of the day it used for a good strategic formulation and implementation process as well.

Internal environmental scanning

Since the success or failures of an organization is mostly attributed to internal analysis of an organization, getting a clear picture and understanding of own capabilities and weaknesses are as important as scanning the external environment. Based on this notion, examining the external and internal analysis would be essential which can be carried out on assessing the SWOT analysis which stipulated below. SWOT is an acronym that stands for Strengths, Weaknesses, Opportunities and Threats. Strengths and weaknesses are normally internal to an organization that can assess, evaluate and change overtime through the strategy formulation and implementation process and if organizations exhaustively explored these factors a head of time then they would able to put a company on the right track and able to draw a good strategy as the human element and resources of an organization are a key players on the implementation phases.

Whereas opportunities and threats are external to an organization, behind their control and unable to change, however if organizations properly assess opportunities and able to exploit it and also identify threats a head of time and design an actions to overcome or minimize threats then the researcher of this article believes that organizations would have a good capacity to formulate a strategy and able to develop a proper implementation plan.

Besides to the scanning of an environment, it would be imperative to examine and synthesize with Porter's five forces of the bargaining power of buyers, bargaining power of sellers, the threats of substitutes, the threat of potential entrants and the threats of existing competition. Since assessments of these forces are vital to formulate a proper strategy, to enter into a new industry or remain competitive in the industry, lacking of a proper attention eventually leads to failure in strategy implementation. This article therefore systematically examines each force from the perspective of formulating a good strategy that also uses to reinforce the implementation phase easier.

Bargaining power of buyers

At this point it is important to consider like concentration of the buyers and bargaining powers, significance of high fixed costs on purchasing, or products homogeneous and standardization that use to avoid any switching costs as at this force there are few buyers who dominate the industry. During strategy formulation this has to be examined seriously and counter measures have to be taken as strategy choices to avoid failure in strategy implementation.

Bargaining power of sellers

Powerful suppliers or sellers would able to capture the market and dominate the industry by charging high prices, limit the quality of products or services provided and also shifts the costs to the industry as they are few in number, and hence in strategy design process organizations have to make exhaustive study and may put alternatives; like, by outsourcing some requirements or on backward integration whichever is suitable to industry scenario.

Threats of substitutes

This is normally considered as a threat to industry or sectors as competitors perform the same function and there is a substitute product or service in which the buyers have a choice to decide and it seems high if buyers have low switching cost. In strategy formulation process this can be avoided if organizations aware of all substitutes in the market, however since there is an information gap already then failures arose in an organization.

Threat of potential entrants

This is attributed to any barrier imposed or that can affect the business or organization functions; like government policy, industry retaliation, any switching costs, product differentiation, capital requirements and economies of scale which should be examined for strategy design process.

Threats of existing competition

This competition or intensity of rivalry has to be done exhaustively to develop a good strategy which comprises among others are assessing the diversity of competitors in the industry, similarity of competitors, how high is fixed or storage costs, is there high strategic stakes and/or high exit barriers and also the rate growth of the industry [12].

Though theoretical reviews portrayed such forces at comprehensive manner, the practical implication is still daunting in which at the end of the day paralyses the strategy implementation process and failures come after. Keeping these assessments into consideration organizations

would able to evolve strategic management process that requires to exhaustively developing each stages in strategy design.

Regarding to strategic management process, Davies (2011) [10] and David & David (2017) [2] states the strategic-management process consists of three stages and as they pointed out strategy formulation, strategy implementation, and strategy evaluation. Strategy formulation includes developing a vision and mission, identifying an organization's external opportunities and threats, determining internal strengths and weaknesses, establishing long-term objectives, generating alternative strategies, and choosing particular strategies to pursue. Since external opportunities and external threats are beyond the control of an organization that would significantly benefit or harm an organization in the future. Hence, strategy-formulation issues include deciding what new businesses to enter, what businesses to abandon, how to allocate resources, whether to expand operations or diversify, whether to enter international markets, whether to merge or form a joint venture, and how to avoid a hostile takeover.

2.2.2 Strategy formulation

Strategy formulation is one of the most important tasks and process that managers in every organization need to perform, has a range of approaches that enjoyed different levels of support and recognition over time, and forces an organization to carefully look at the changing environment in order to combat the possible changes that may occur [13]. Though, this stage is assumed to be one of the major steps in strategic management process, ignoring or giving little attention to strategic formulation and poorly framed the formulation process eventually lead challenges in implementation process.

2.2.3 Strategy implementation

Strategy implementation is a very crucial part in strategy planning as mostly failure arises at this stage though the reasons require further study. In this regard review of literatures indicates "strategy implementing is a tough and time consuming challenge." And, further pointed out that it would be easier to develop a sound strategic plan than it is to make it happen since it requires a managerial skill that able to put strategy into effect and get the organizations moving in the chosen direction [13]. Besides, another scholar stated that "strategy implementation has become an essential part of business strategies for companies to stay internationally competitive." To successfully implement strategy it involves some process; like, it should start with a good strategic input, the implementation works when there is a clear strategic action plan, resource allocation is also another critical factors, employee involvement and corporate cultures as it is important for organization performance [14].

The major resources that play a key role in strategy implementation process are employees of an organization in which "when employees are committed to the strategy, they recognize that their efforts are an integral part of the organization's successful strategy implementation" [15].

2.2.4 Strategy evaluation

The evaluation part is the other most important part if it is taken positively and a quality leadership there in an organization it serves as feedback to take immediate remedial action and get backs all resources (financial, non-financial and human resources) on the right track. In line with as the other authors states "strategy evaluation involves setting control processes to continuously review, evaluate and provide feedback concerning the implemented strategies to determine if the desired results are being attained such that corrective measures may be taken if needed." [13].

Though, theoretical studies of strategic management elaborated more about strategy formulation process and implementation as well, as Iheanachor (2022) [16] states "the phenomenon of strategy execution in particular and strategy in general, is as complex as other concepts in social and behavioral sciences".

Hence, the author of this article perceived that studying about the strategic management process especially with respect to implementation phase and the causes to failure are still a daunting field of study that need extensive research and based on this notion the critical review of strategic management and shortcoming in implementation are assessed below.

2.3 Strategic management processes in an organization

Hence, as to maintain an organization as a going concern management bodies of an organization would require to clearly put the strategic management process with the nature of their business. Especially, when organizations inculcate the notion of strategic management it is indispensible to raise the point that where we found an organization after a certain period of time which is from the perspective of practical implication.

Figure 1 indicates how the organizations move and place there after a certain time.

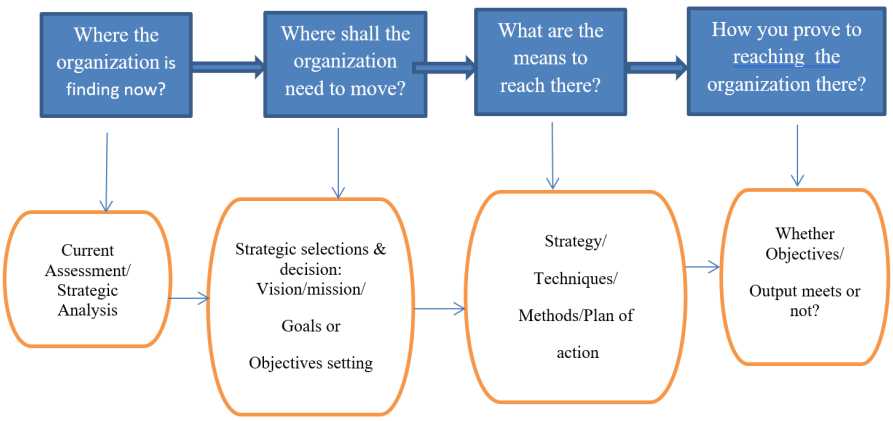

Figure 1 Strategic management processes in an organization (Source: Own research, 2022)

We can perceive from the above diagram that on the strategic management process organization has to assess the present or current situation first which is normally called strategy analysis and at this stage an organization able to examine both the internal and external environments. In internal assessment, the organization has to examine its strengths and weaknesses whereas in external assessment it should examine the industry situation (which is competitor analysis), opportunities and threats.

Since strategic analysis is the most fundamental part in strategic management process, according to Graham & Hede (2016) [17] strategic analysis used for managers to examine first what is happening in an organization, able to explore the reason why it happened and determine a head of time its impacts on performance. Besides the authors mentioned important steps in strategic analysis stages; like, reviewing the previous performance that had a notable impact on the organization's bottom line, assess its positive or negative impacts, identifying the type of each action, determining the origin of each action as being either a new initiative or a response to an internal or external circumstance, developing strategic intentions (plans) for the next cycle and lastly modifying the organization's ongoing planning and reporting processes to accommodate emergent actions in the future.

Though scholars pointed out their views on strategic analysis, the critical argument is that conducting the analysis part is somewhat different from organization to organization, business to business and one industry to others and that is why the real challenges or failure in implementation existed. After strategic analysis carried out organizations have to focus on strategic selection and decision process which mainly focus that on strategic selection process it requires to exhaustively examine the strategic options evolved from the perspective of real business scenarios.

If the strategic selection process is done wisely, it would pave the way to make a good strategic decision as strategic failures usually arise due to poor strategic decision process. This point is further supplemented by Papulova & Gazova (2016) [18] that "strategic decision-making belongs to the one of the most important areas of current management and plays a crucial role in achieving success and survival of the company.

Hence the researcher point of discussion is that once organizations have developed a strategic analysis and selection process, it moves to develop a vision, mission, goals and objectives in which it indicates after a certain period of time where shall the organization has to be, then it is important to design the strategy/techniques/methods or plan of action in which the organization able to reach its vision, mission goals/objectives or it is considered as the output required from strategic plan. Though defining those common terms such as vision, mission, goals, objectives, critical success factors are not the objective of this research, in most situations, organizations set forth these terms as a guiding principle or mottos despite being no strategy plan formulated before.

However, the researcher found that the implementation process is a bit challenging as an inadequate or poor plan of action is a result of failure in implementation process. This point is augmented by an academician that strategic implementation need a serious action of categorizing important issues, decisions and coherent relationships to complete the task that set before [19]. Lastly, whether an organization reaches what desired before or not will be measured on evaluating the objectives or outputs which enable to take corrective action. Hence, these steps are very crucial on strategy executions process despite the implementation and evaluation part needs a big attention.

To sum up, the purpose of strategic management process is to exhaustively examine all

steps and put forward strategic choices and alternatives which eventually enable to reach a best decision. Taking these actions seriously is crucial as organizations are moving in turbulent environments and there is no question to raise the concept and importance of strategic management which also enable to develop achievable strategic plan. This point is advocated by Phiri et al (2019) [20] as "strategic management process is every manager concern as any failure in determining strategies which matches with resources and capabilities of the organization is devastating to its overall sustainability survival and growth. Companies without clear strategies may achieve some success in the short run, but as soon as competitive conditions stiffen or an anticipated threat arises, they usually "hit the wall "and fold."

3 Reason for strategy failure

Research carried out so far on strategy implementation is still in its early stage with a limited number of empirical studies completed and historically most of the effort has been focused on strategy implementation [21]. This is because the numerous researches carried out for decades elucidates majority of strategy failure has been arisen at implementation phase. In this context, despite formulating the strategy plan being one of the fascinating works in an organization, the greatest challenges come from in the implementation process in which usually noted when failures come. Though the reasons for failure in strategy differ from organization to organization, empirical research found out that there are some major reasons for failures.

Accordingly, as Arnoud (2014) [22] pointed out the major reasons for strategy failures are incompetent management, a vague strategic vision, an inadequate strategy, lacking implementation plan, inadequate planning and control, neglect of political interests and a culture of fear. Available on https://www.cascade.app/blog/7-top-reasons-why-strategic-plans-fail.

Besides as Tom (2021) [23] identifies also there are seven reasons to strategy failures such as lack of buy-in from the team, unclear objectives, failure to account for business as usual, loss of momentum, unwillingness to iterate, lack of alignment and failure to celebrate success.

From the above reasons the author of this article perceived that whatever and a best strategy you design, without proper buy-in from all staff, cascading and communication it would be unrealistic to successfully implement strategy plan.

4 Pitfalls/challenges in strategy execution process

The author of this paper noted that strategy execution is normally attributed to bridging the gap between what an organizations aspire and the result or output attained. If the gap is filled it is a success for organizations and when failures occurred it is due to weak execution process in which normally ascribed to management dormancy or inefficiency. Empirical studies also portrayed that "strategy implementation can influence the whole texture of a company including its performance" [14]. Regarding proper execution of strategy, literatures revealed that a successful strategy formulation often leads to success in strategy execution, however to make an integrated approach to strategy issues, organizations must focus on ensuring that adequate measures are established a head of time [16].

On the other hand, scholar's figured out only a small percentage of planned strategy got success, in this respect as Vigfússon et al. (2021) [21] state research carried out on strategy implementation is still at early stage, with only limited number of empirical studies so far completed and most of the organizations efforts have been focused on strategy formulation and process by giving less attention on strategy implementation.

Based on this introductory phrase some of the pitfalls or challenges on the strategy execution process that sort out by scholars are portrayed as follows:

(1) Using strategic planning to gain control over decisions and resources;
(2) Doing strategic planning only to satisfy accreditation or regulatory requirements;
(3) Too hastily moving from mission development to strategy formulation;
(4) Failing to communicate the plan to employees, who continue working in the dark;
(5) Top managers making many intuitive decisions that conflict with the formal plan;
(6) Top managers not actively supporting the strategic-planning process;
(7) Failing to use plans as a standard for measuring performance;
(8) Delegating planning to a "planner" rather than involving all managers;
(9) Failing to involve key employees in all phases of planning;
(10) Failing to create a collaborative climate supportive of change;
(11) Viewing planning as unnecessary or unimportant;
(12) Becoming so engrossed in current problems that insufficient or no planning is done;
(13) Being so formal in planning that flexibility and creativity are stifled [2].

A systematic conviction of the author reviews induces it would be arguable for the notion that a successful strategy formulation often leads to success in strategy execution or not since the challenges in strategy execution remains a ruinous issue.

5 Empirical review

Although there are numerous theories with respect to strategy analysis, strategy formulation and strategy evaluation, the most critical part is examining strategy implementation as the success or failures in strategy is most likely arises at this stage and due to this reason assessing some empirical reviews is crucial for the study. To this context empirical review elucidates employees are more in-charge of the implementation phase as understanding of vision and mission by employees, developing clear strategic action plan, allocating adequate resources, providing sufficient training to employees, involvement of employees on decision making process, rewarding system and establishing a strong corporate culture are very important for successful implementation of strategy [3].

In addition, an empirical research proved that proper implementation and execution of strategy is very crucial and significantly affects the success of an organization [3]. Doelman et al. (2021) [24] states also in the field of management studies organization mostly focuses on the formulation of strategy and neglects the implementation stages that leaves the field of study still remain under-researched and due to this reasons senior executives largely consumed their time on strategy formulation than implementation stage. Besides, as Hrebiniak (2006) [25] portraits formulating strategy is difficult but making strategy work – executing or implementing it throughout the organization – is even more difficult, and the author further noted that without effective implementation, no business strategy can succeed. Unfortunately, most managers know far more about developing strategy than they do about executing it.

From the empirical review above the author of this article deduced that numerous number of managers are more aware of developing strategy analysis and formulation and they disregard or give little attention to the strategy evaluation and implementation stages in which ignoring of these processes coupled with poor participation of employees and lack of sound communication at organization level drive them to incur a huge cost and time that eventually lead to failure in strategy implementation.

6 Conceptual model of strategic execution process

The foundation of theoretical and empirical reviews enable researcher to get a clear picture of the gaps or problems on the study and this in turn uses to build a conceptual model that the research questions or hypothesis have to be addressed. Based on this notion depicting the nexus, interaction and reaction of strategy analysis, strategy formulation, implementation and strategy evaluation are important as shown below for a proper execution of strategy and the evaluation part as well to take a corrective action as one stage or step use as a precondition to assess and examine the next steps. (see Figure 2)

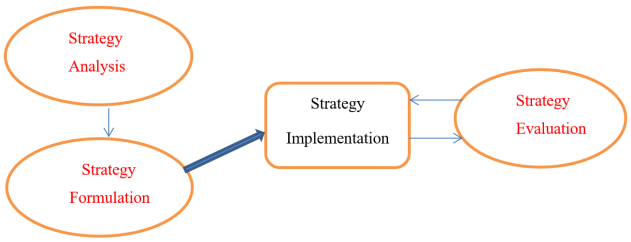

Figure 2 Model of strategic execution process (Source: Own research, 2022)

Despite the stages of strategic management process being assessed above the above model indicates after examining of strategy analysis; such as internal and external evaluation, a strategy formulation is carried out in which it is one of the big task as it usually requires a detail analysis of organization competence with respect to industry average and on identifying a suitable generic strategies. Though examining the strategy variants of Porter's generic strategy is not purpose of this study, it would be imperative to elucidate slightly in the strategy formulation and execution process.

The Porter generic strategies are essential in strategy formulation process and the concepts imply when a company employed differentiation strategy, firms able to offer unique products or services that able to charge a premium price, in case of low- cost strategy firms able to focus to achieve competitive edge in the market by offering a standardized products whereas in focus

strategy by linking differentiation and low-cost strategy in the niche market firms would able to concentrate in specific regional market, product line or group of buyers to make a higher profits [26]. Besides the generic strategy stipulated above it is also equally important for an organization to examine and associate with competitive advantage as research demonstrated there is a positive association between Porter generic strategies and competitive advantage of an organization [27] since assessing this part is very crucial in strategy formulation process.

Once organizations identify the right generic strategies, it would use to develop a clear strategy implementation plan, however, since most of organizations leaders don't give adequate time to examine about how strategic process is going and the paradox in which everything unable to go as we anticipated it would be inevitable that a strategy execution process demands a good leadership and management excellence, Hence, to check the implementation stage and take appropriate action on time the strategy evaluation plays a great role. Accordingly, a strategy evaluation process requires measures like whether the implementation process goes smoothly or not, and to measure these a proper action plan and a key performance indicators/KPI/ have to be set ahead of time. So the objectives of strategy evaluation are not only to examine and identify the gap or weakness of strategy implementation instead it gives a feedback and recommend remedial action to correct the mistakes which in turn would able to avoid bottlenecks and able to drive for a successful implementation of strategy plan.

7 Methodology of the study

To explore the pitfalls in strategy implementation the research employed a deductive research approach of an exploratory research design in which it focused a review of qualitative data's with systematic research review and narrative explanation as these were vital to explore and investigate the problem of a study. Accordingly, as a criteria for the research and to synthesize the study a qualitative review of scholar's research; specifically, published books and journal articles are used. The samples taken for a systematic review have been 22 peer-reviewed theoretical and empirical studies with longitudinal time series of 5 years (2018 to 2022). Based on systematic theoretical and empirical review a conceptual model is developed to further evaluate and synthesize the challenges on implementation process and would eventually led to descriptively and critically analyze the result of the study.

8 Results and discussion

There is a general thought that when an organization able to develop strategy comprehensively, the rate of failures get lower and lower regardless of this requires an investigation by itself. However, the result of this study depicts though organizations have developed a good strategic plan on taking each steps of the strategic management process, the great insight that can be drawn from the finding is that how organizations would able to overcome the challenges on the implementation phase; specifically, it targeted on the readiness of managers to work closely with employees and also their initiation of designing an achievable action plans and the mobilization of all resources for successful implementation are more important.

Hence, one of a great gap identified in this process and the author of the article critically evaluates that lack of proper strategy evaluation is a major drawback as it enables to examine how the implementation process is going and further give a feedback to managers to take appropriate actions in time. This point is underpinned by a theoretical foundation that effective strategic actions require an achievable process that has to be done by integrating strategy formulation and implementation which also uses to get a desired strategic outcome [6].

Besides, the major finding of the study revealed that the failure in strategy implementation is mostly attributed to inefficient management bodies as they ignored the participation of all employees in execution process and disregard for the proper communication. This point is reinforced by empirical study that the failure of strategy execution characterized by weak communication, insufficient senior leadership, inadequate skill, lack of approved strategy, insufficient details, poor accountability, weak monitoring and evaluation process, limited reward and its consequences, leadership style as well as conflicting priorities [16].

This point is also supplemented with this research finding that the common pitfalls identified on strategic execution process are lack of proper communication, weakness of top managers not to support the planning process, managers are looking strategic planning only for accreditation or regulatory requirements, inability to use plan for measuring performance, viewing planning as a waste of time, money and unnecessary and also failing to involve key employees on the process are the major ones [2].

As a discussion of the study the researcher pointed out that mangers and organizations shall thoroughly examine each stages of the strategic management process by giving equal weights to

each phases and finally give more emphasis on implementation and evaluation phase so that they would able to overcome the pitfalls pointed out on this article.

9 Conclusion and future scope

The purpose of the study is to assess the strategic making processes and identify the pitfalls or challenges on the execution process and put forward a possible recommendation as a future direction. In this regard, systematic reviews of the study portrayed that organizations have to design a proper strategic management process by giving emphasis and equally integrating each stages in the process. Based on this notion the researcher try to address the research questions of do organizations have a mechanism to properly evaluate the implementation of strategy, the systematic review of the study revealed that despite organizations and management bodies being exerted all efforts and resources to design a good strategy, the great challenges stem from the inability to have a proper evaluation system which leads to failure in strategy implementation.

In this regard, historical and practical lessons in an organization indicate after a good strategy is formulated, mostly managers drop it on the shelf, unable to give a time at least once a month for a progress discussion instead they used the document only for propagation purpose. Hence, as it stated in the review of this paper an organization managers/executives require to develop and design a mechanism or detailed action plan that would be measured and assessed besides that of the involvement of management initiation and commitment which in turn pave the way to make the evaluation process easier.

The second question of identifying the pitfalls in strategy execution of an organization and the ways to overcome it is addressed by systematic review of the articles in which facing a challenge in implementation process is a common scenario that mostly attributed to inefficiency or ignorance of management bodies. As theoretical finding reveals although the notion of strategic management process is a very fascinating issue, the most challenging and least ignored part is the implementation phase as senior executives and managers couldn't give proper attention and at the end of the day organizational failures arises. To overcome such challenges the finding of this article delineated that organization managers have to be serious on the whole approach of integrating the strategic management processes that needs coherence from top management to lower level and especially an effective communication and a cascading process are very crucial for successful implementation of strategic plan. This result is a major limitation for mangers in execution process and it would have a great implication to get lesson from it.

As a future direction, conducting a more in-depth and a field work research on strategy execution process are vital as the paradox on implementation process still remains an exigent task.

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CASE STUDY

A quantitative approach to risk-driven strategy formulation: A case study introducing a real-options framework

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Abstract: The thesis of this article advocates that a quantitative and analytical approach to the business value *vs*. risk relationship can effectively support company strategy formulation processes dealing with uncertain business scenarios. Within the grounded theory methodology, a suitable case study was selected among SMEs, and a real-options (RO) framework was applied to address the research question. This inductive-empirical methodology shows that the RO framework, in conjunction with the Montecarlo method, is a valuable tool capable of supporting the best strategy formulation by purposefully connecting risk with business value. Furthermore, it has been demonstrated that the RO framework can maximize business value in markets characterized by deep fundamental uncertainty. This article is of interest to both scholars and practitioners. Strategic thinking research can benefit from the conclusions of this paper by conceptually reinforcing strategy formulation theories based on organizational resource-investment choices exploited through the RO lens. Practitioners can verify the strengths of the RO framework in practice. Moreover, they can adopt the combined use of the RO framework and the Montecarlo method as a leading factor for strategy-setting processes and a trigger for shaping strategic risk management practices within their reference industry.

Keywords: strategic risk management, strategy formulation, real-options, RO valuation, risk-driven decision-making, enterprise risk management

1 Introduction

Management scholars are excited about real options (RO) logic in the hope that it will improve performance [1]. RO logic helps managers create value when making decisions because it focuses on managing the uncertainty concerning an investment's upside benefits and downside threats [2]. This approach, called managerial flexibility [3], is based on the presumption that an option allows managers to take action in the future, depending on the contingencies and new information that arise within industry uncertainty. In this respect, an RO framework can shape the level of real asset investments and maximize business value in markets characterized by different degrees of trade-offs on the downside risk and upside potential [1, 4]. The distinctive characteristic of an RO analysis is how it deals with uncertainty. Compared to other techniques where uncertainty, or risk, is generally seen as a variable decreasing the value of an asset, from an RO perspective, it becomes the primary driver for increasing the value. By capturing the upside of uncertainty, RO analysis is most beneficial when the surrounding uncertainty is high [5].

Thus, active strategic risk management combining RO logic can create added value under uncertainty. In this regard, cutting-edge strategic risk management frameworks call on companies to change the relationship between business value and risk. Historically, risk or uncertainty was perceived as limited and containable by time and space, and risk management practices were implemented to protect the company's strategy. Now, every single asset of a business is affected by uncertain variability. Therefore, the emerging approach entails starting from risk to strategy formulation by exploiting the match between risk and business value. In addition, the sequence changed, and the link between risk-taking level and business value creation has shifted from a qualitative to a more quantitative perspective. In light of these premises, a firm must have the flexibility to respond advantageously to its changing environment to survive and prosper in dynamic markets. To this end, the firm strategy should include a well-defined, structured set of strategic options that a firm might exercise [6]. Through a real-options valuation (ROV) lens, strategy is seen as a process of organizational resource-investment choices or options [7]. In this respect, the options lens offers an economic logic for the behavioral process of incremental resource investment [8].

This article contributes to the RO empirical research in management by investigating the use of RO in practice. Gathering data on company decision-makers dealing with uncertainty and the actual use of RO analysis can help researchers understand this method's practical strengths and weaknesses. Moreover, this article argues that a quantitative approach to the business value *vs.* risk relationship can advance corporate risk management practices toward an industry-leading strategy formulation support framework. More precisely, this empirical work introduces valuable quantitative tools, *i.e.*, the RO in conjunction with the Montecarlo method, that establish a link between risk and value. This link triggers a shift in company risk management practices from one position in the strategy-setting process to a more sophisticated one. Company goals are underpinned when these practices are applied in a downstream strategy-setting process. Instead, they enable strategy formulation when involved in an upstream strategy-setting process.

2 Theoretical background

The development of RO theory rests on a set of key variables intended to describe the endogenous and exogenous factors that affect how an investment opportunity is valued. In identifying the variables encompassed within RO models, companies may formulate strategies, determine business terms, and make decisions on the options that influence volatility in the factors affecting resource value [9].

Within the pertaining literature, the relationship between RO logic and performance is examined from three perspectives [1]. One part of this research suggests that possessing a portfolio of real options or making real option investment decisions improves overall firm value [10–12]. The second perspective focuses on the financial consequences - firm performance - of making a RO decision [13–16], while the third part discusses individual performance [17].

This paper is aligned with the first perspective, specifically with those scholars' research arguing that strategy formulation may be conceived as a portfolio of real options [6, 7, 18]. While some researchers have restricted their attention to strategies centered around specific options, Bowman and Hurry [7] extended this approach by showing how strategies emerge from an organization's resources and unfold over time in different ways. When executives create strategies, they project their organizations into the future, envisioning a path from the present to future growth. However, no one expects to formulate a detailed long-term plan and follow it unwaveringly in competitive markets. As soon as the company undertakes the path, the learning process begins – e.g., business conditions, competitors' actions, the quality of skills and competencies – and the company's needs and ability to respond flexibly [18].

Strategic management scholars' severe academic interest in risk management probably began with Bowman's [19] research. His article empirically demonstrated that, in security markets, business risk and return are negatively correlated across companies within industries, which spurred much research on risk in strategic management [20].

The research course about strategic risk management within a highly-unpredictable business environment outlines its significant insights related to environmental scanning [21], scenario planning [22], the importance of efficient risk management practices as a way to avoid corporate disaster [23], the use of RO in strategic decision-making with uncertainty [24], and the relevance of the dynamic capability theory to deal with deep uncertainty [25].

Since Bowman [19] published the results of his research in 1980, corporate risk management practices have undergone a profound evolution. Upon every single asset of a business affected by deep uncertainty, the emerging approaches fostered by enterprise risk management (ERM) practices consider risk first, strategy formulation second, and business value creation measurement last when formulating the best strategy. Historically, risk was perceived as limited and containable by time and space, and practices were implemented to protect the strategy. Four evolutionary generations emerge within the theories and managerial practices developed during ERM maturation [26]. During the first three generations, the concept of risk management evolved from the initial identification of principles [27, 28] through the definition of the link between risk *vs.* profit and productivity [19, 29, 30] to a holistic approach [28, 31–34]. This fermentation ultimately led to the fourth generation, and the ERM configuration is currently being developed as a governance tool. This latter evolution gives new importance to ERM: it has shifted from a contained corporate process to an open governance discipline codified in models such as ISO 31000 [35] and the COSO framework [36]. Therefore, this fourth generation establishes ERM purpose as the capability to drive uncertainty to create value, which is a company's ultimate goal, and its objective as the capability to pursue an effective risk-based strategy formulation. The valuable merging of ERM and strategic business management aims to propel a shift in ERM principles from a downstream strategy-setting process oriented toward defending a company's goals to an upstream process oriented toward supporting strategy formulation. Despite the rhetoric about the importance of adopting ERM as the discipline leading this

strategic perspective, surveys about actual business practices indicate that companies' attempts to identify and manage strategic risks within an ERM framework are still quite limited. A study from the Economist Intelligence Unit highlights that "strategic risk management remains an immature activity in many companies" [37]. In a recent practitioner survey, respondents see their firm's integration of its risk management processes with strategic planning as one of their most significant weaknesses [38]. This evidence demonstrates that traditional risk management is mainly oriented toward strategy support instead of strategy formulation. Only a few companies have indicated that risk management personnel are formally involved in strategy formulation and strategic decision-making [32]. Risk management has traditionally focused on protecting against downside risks while paying little attention to strategic opportunities or upsides. This one-sided perspective is problematic in offering an adequate response to strategic risks. It overlooks an essential source of value creation underpinned by related opportunities in terms of future RO to exploit.

In 1977, Myers [39] published an influential article in the Journal of Financial Economics in which he coined the expression "real-options" by noting that company value results from both the assets in place and the opportunity to purchase tangible assets at potentially favorable prices in the future, *i.e.*, real-options. This expression draws attention to the similarities to financial call options since they confer the possibility of acquiring assets - call options - or divesting assets - put options - in the future at a price that may be attractive for those holding the options. McGrath [40] developed a theory specifying how the relationship between boundary conditions and uncertainty influences the value of real asset options and the appropriate timing of their exercise. In addition, she addressed the strategic perspective on uncertainty itself, arguing that investments in technology can expand a firm's value because they allow the firm to shift boundaries by enabling a more comprehensive range of real-options. Miller and Waller [41] showed how managers might use RO to identify and categorize relevant uncertainties in this context. They concluded that managers should address the full spectrum of uncertainties about a firm's performance and should be able to explicitly identify the critical contingencies affecting each business and the nature of their effects. Triantis [42] supported this thesis by pointing out that managers should ensure that the company can access a wide array of real-options to pursue increases in the firm's value. He concluded that the expansion of the firm's value is underpinned by an integrated strategy that combines the creation and exercise of RO with other risk management techniques. Driouchi and Bennett [43] observed that firms that have developed a solid managerial awareness of their real-options or acquired significant knowledge in RO analysis could grow the firm value by reducing their downside risk through multinational flexibility and organizational slack. In markets characterized by fundamental uncertainty about future outcomes, this strategic-options perspective spurs the debate as to whether it is possible to distinguish superior management knowledge leading to outstanding growth and profitability by accumulating unique resources and capabilities [44–46]. Furthermore, the strategic-options perspective suggests a new theory, which can be tested empirically to explain business performance in dynamic markets [6].

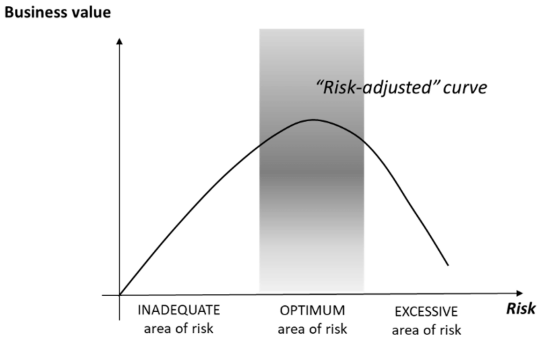
The traditional business performance valuation methods, such as net present value (NPV), are incapable of capturing the value of managerial flexibility under uncertainty in real investments. Although many approaches have been proposed as tools for RO valuation [47], RO analysis offers a solution by incorporating option-pricing theory into the evaluation of real investments [5]. By building option pricing into a RO framework designed to evaluate hard assets and opportunities, a company can include financial insights earlier in the strategy development stage rather than later in the creative work of strategy [18].

In this paper, the term strategic options, which denotes the firm's investment options under business scenario changes, encompasses the opportunities for growth [39] and the operating flexibility in the choice of the real-options to focus on [48]. In this respect, the different definitions of value given by the authors who analyze business valuation issues testify to its definition's complexity [49]. In this paper, the adopted business value definition refers to its expected cash flows – the traditional valuation basis in finance – plus the value of the firm's strategic options. According to this definition, value wholly reflects an enterprise's internal situation and changes in its external environment.

From a value-creation perspective, leveraging risk up-front allows companies to operate under risk-taking levels that are always consistent with their predisposition to risk. A company's predisposition to risk is defined as its risk appetite, *i.e.*, the amount of risk it agrees to take while pursuing business goals. It is a subjective value, a conscious recognition, and acceptance of the risk-return trade-off leading the strategy-setting process.

Figure 1 helps to understand the nature of the relationship between risk and business value [50, 51]. The function describing the relationship between the independent variable risk and the dependent variable business value is named the "risk-adjusted" curve and has an inverted-U

shape. As shown in Figure 1, inadequate risk-taking leads to low business value, as does excessive exposure to uncertainty. There is an optimum area where business value reaches its peak. This relationship represents a key concept in today's strategy formulation approach. As a quantitative approach to business value *vs.* risk relationships, Montecarlo simulation, widely known, and RO, which deserves more attention, are applied. These methods draw explicit key assumptions often left undescribed or implicit in other methods. By using numerical analysis and a detailed scheme, they depict boundary conditions and complex relationships that are otherwise neglected or overly simplified [24, 39, 42]. Furthermore, these methods are more practical for describing and evaluating uncertain market conditions than other methods, e.g., DCF [24, 52].



Note: The business value depends on the risk assumed by the company, which should find the correct balance, the optimum risk-taking generating the best business value, between inadequate and excessive risk. This representation is named the "risk-adjusted" curve.

Figure 1 Business value *vs.* risk

2.1 The limitations of the existing literature

RO empirical research in management published in leading journals over the past 25 years suggests that, while some progress has been made, much more work needs to be done [1]. Several past reviews have indicated that the focus on using RO in practice should be more researched [54, 55]. Despite ample theoretical recognition in literature, the RO approach has not yet gained much traction among practitioners. The availability of multiple valuation methods for RO analysis and the difficulty of choosing the optimal method are reasons for the lack of application in the corporate world [5].

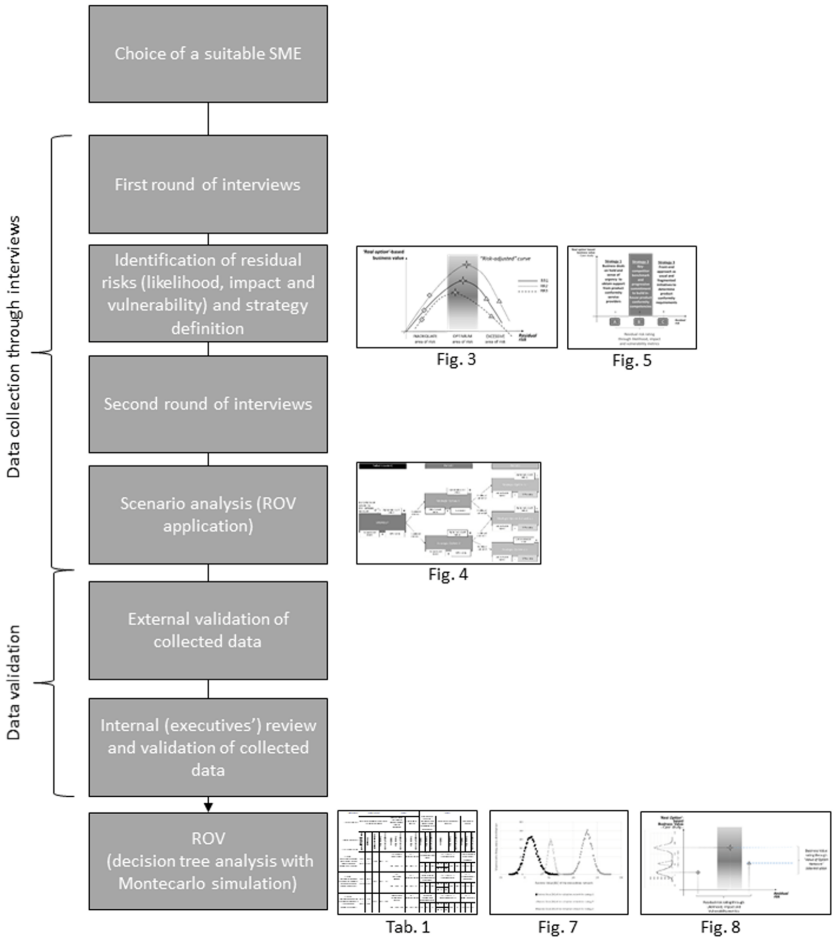
Furthermore, reviewing the literature on strategic thinking research focusing on risk-driven strategy formulation, little has been studied and written about quantitative approaches to strategy-setting by linking risk and business value. Strategic risk management dealing with deep uncertainty has not been very well developed in the pertaining literature [53]. Although scholars have studied quantitative methods by applying the RO logic to many specific business aspects, an analytical and explicit approach to the strategy formulation process through the RO valuation lens seems not thoroughly addressed yet [1].

3 Methodology

The research strategy relies on using a case study within an inductive framework. Based on the research aim of identifying quantitative tools that can support a risk-driven strategy formulation, a suitable case study among SMEs was selected, using RO in conjunction with the Montecarlo method as the analytical tool. The choice of a 120-headcount SME trusts that SMEs represent a source of entrepreneurship abilities and innovation. Their capacity to apply, adapt and disseminate new technical and managerial knowledge is unique and lets them become the backbone of social-economical progress [56]. Furthermore, although belonging to a specific industry sector, the chosen company's organizational structure and business dynamics let it represent a broader class of companies.

A conceptual framework diagram of the research methodology process is shown in Figure 2.

By applying the grounded theory methodology [57,58] data were collected through interviews with the chief executive officer (CEO), the business development manager (BDM), and the chief revenue officer (CRO) of the focal firm for the period between September 2019 and February 2020. These six months were planned to gather and handle a rich-thick description of the applied RO framework. The data collection and analysis phases were carried out concurrently until saturation, the point at which all data were identified and consistent across their many forms. To ensure the validity of the data analysis, the researchers triangulated rich-thick descriptions, clarification of researcher bias, and evaluation of negative or discrepant



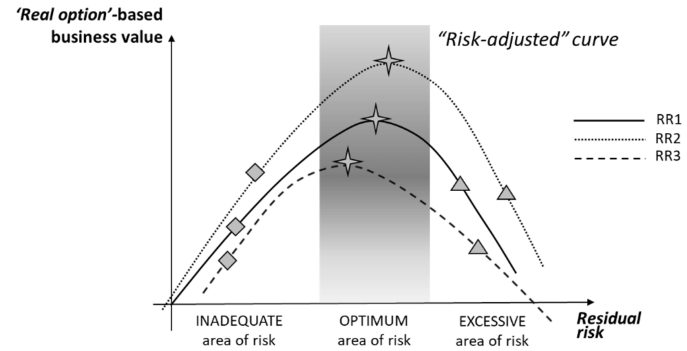
Note: Sequentially, the choice of a suitable SME for the case study, the data collection through two interview rounds, and the data validation by the SME's executives. Finally, the RO valuation by applying a decision-tree analysis with Montecarlo simulations.

Figure 2 The conceptual framework diagram of the research methodology

information. Furthermore, the transcripts of interviews were returned to the company executives for review and additional information needed for clarification.

As the company requested to protect sensitive information, the data and the specific business scenarios shown in this article were readapted for a clear and comprehensive presentation while maintaining confidentiality.

Two rounds of interviews were conducted. The first round pointed to an in-depth description of the relationship between risk and business value, as expressed in Figure 3 - borrowed from the conceptual approach introduced in Figure 1. Given that relationship, the risk-ground x-axis entry point is quantified by residual risk in terms of likelihood, impact, and vulnerability values. The company identifies residual risks after the organization has taken proper precautions. Figure 3 shows risk-adjusted curves plotted for three different strategic risks.

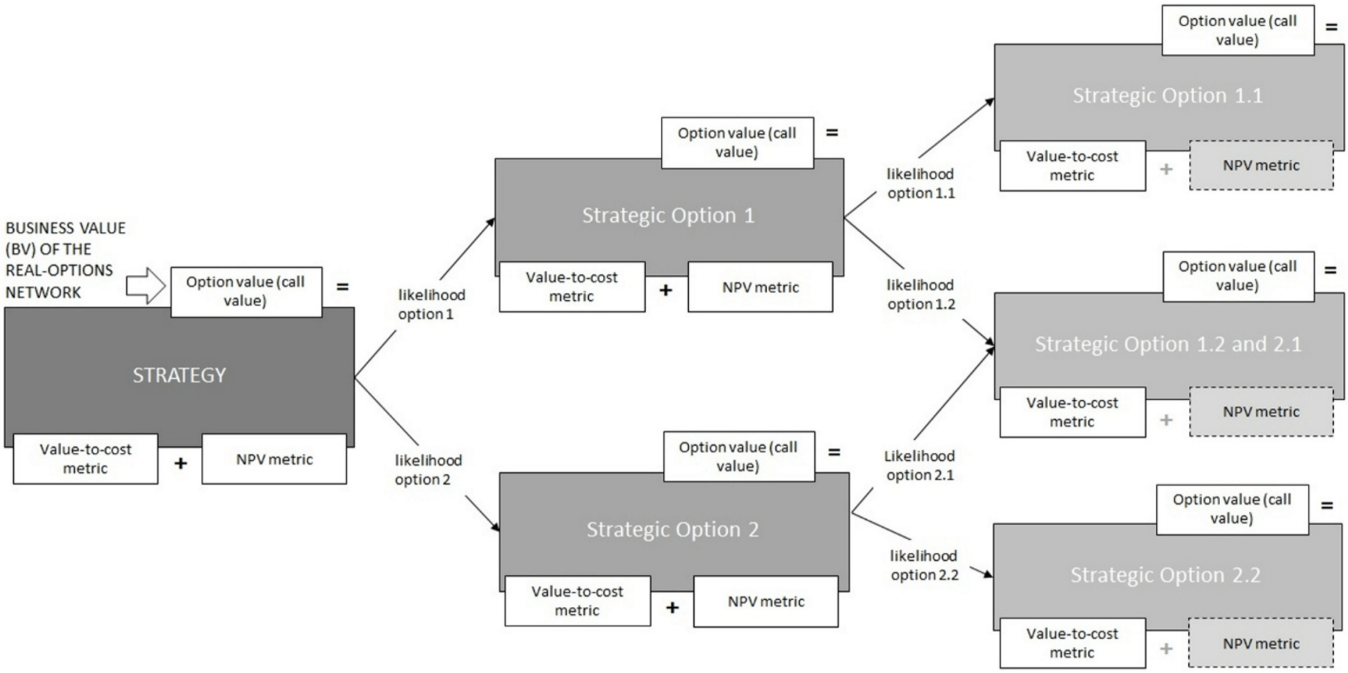


Note: Three risk-adjusted curves are drawn for three different strategic risks (RR1 to RR3). Each strategic risk is evaluated through the business values assumed within the three different areas of risk.

Figure 3 Business value *vs.* residual risk

The range of strategic decisions runs from a very low to a very high risk-taking foundation. Over this increasing risk continuum - valued through impact-likelihood-vulnerability metrics - the right amount of risk to bear is delivering the highest business value in return. The company's risk appetite shapes the three areas of risk, *i.e.*, inadequate, optimum, and excessive. The business value is calculated to quantify the potential returns balanced against the risk-taking amount. Therefore, inadequate and excessive risk areas depend on the company's willingness to accept a specific amount of risk in pursuing its strategies. In this light, the boundaries among risk areas form a dynamic link between strategy, business value, and risk management.

The second round of interviews focused on scenario analysis during the time periods concerned to address the uncertainty better. A Decision-Tree Analysis (DTA) was employed to outline possible scenarios along a timeframe of three periods (period 1 - current, period 2, and period 3). DTA is a DCF-based approach that incorporates managerial flexibility as decisions at distinct, discrete time points. The possible decisions are mapped in a tree structure, and their consequences (cash flows) depend on uncertain future events described by probabilities. Management is expected to make decisions based on the expected risk-adjusted NPV of the following states of nature. The optimality of decisions must therefore be evaluated by working backward from the outcomes, determining the expected NPVs of prior decisions [59]. The DTA approach entails identifying a finite set of possible future choices within each scenario, ordering them temporally to set up a real-options network – e.g., the scheme in Figure 4. Each strategic option of the network obtained was then characterized by its uncertainty - single likelihood values or a probability distribution. In addition, the exercise price - company investments - and the underlying asset value - differential profit - were given to each strategic option.



Note: The strategic options are deployed according to the scenario evolutions over three periods. Each strategic option is characterized by the value-to-cost and NPV metrics, whose sum determines its call value and the likelihood of the corresponding scenario evolution. The option value of the first period is the value of the entire real-options network, *i.e.* the Business Value (BV) of the strategy.

Figure 4 Real-options network

Equation 1 to 3 express the option value (aka call value). The option value is calculated as the Net Present Value (NPV) of the future option values, weighted on their likelihood.

Therefore, the option value results from the following Net Present Value (NPV) formula [60].

$$\text{NPV formula} = \text{NPV of the initial investment} + \text{NPV of future cash flows}$$

The NPV of the initial investment doesn't need to be discounted and, within the real-options framework, corresponds to the first addend in Equation 1, *i.e.*, the value-to-cost metric. The value-to-cost metric is not discounted since it is charged to the period of the related strategic option.

The NPV of future cash flows needs to be discounted and matches the second addend in Equation 1, *i.e.*, the NPV metric.

$$\text{Option Value (call value)} = \text{Value-to-cost metric} + \text{NPV metric} \quad (1)$$

The value-to-cost metric is described in the following Equation 2.

$$\text{Value-to-cost metric} = \text{underlying asset value} - \text{exercise price} \quad (2)$$

Equation 2 expresses the initial strategic option entry value. It is determined through the combination of the underlying asset value in terms of differential profits and the exercise price in terms of company investments assigned to each strategic option.

The following Equation 3 expresses the NPV metric.

$$\text{NPV metric} = \Sigma_{\text{i}} \text{ option value } \text{i}_{\text{i},t+1} \times \text{ likelihood}_{\text{ i}} \times 1/(1+\alpha) \quad (3)$$

Equation 3 conveys the NPV of likelihood-weighted discounted future (period 2 and period 3) option values. With α the discount rate of return that could be earned in alternative investments, t the number of timer periods, and i the options in the t +1 period.

As shown in Figure 4, the Business Value (BV) of the entire real-options network corresponds to the option value in the current period (Period 1), and it is the quantitative estimation of the business value of the whole strategy.

Due to the uncertainty of the context, significant parameters are better described by a statistical distribution. So, an estimation of the real-options network value is obtained by running a Montecarlo simulation on the probability distributions of the metrics identified.

4 The case study: results and discussion

The following case study is intended to show how the theoretical framework introduced in the methodology section (Figure 3 – Business value *vs.* residual risk and Figure 4 – Real-options network) is effectively put into practice. Due to confidentiality requirements and a clear and comprehensive presentation, the data and the specific business strategic scenarios shown in the case study are a readjustment of the actual context. The data and information were modified and readapted from the case to protect the company's confidentiality.

4.1 The context

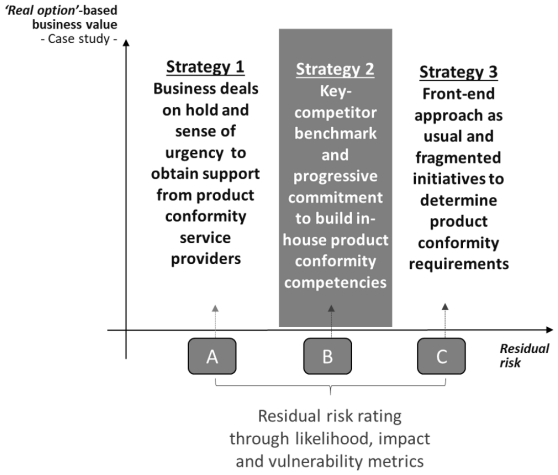
The company operates internationally in the B2B sector of the chemistry industry. Its product portfolio covers a range of market segments, from industrial to healthcare process applications. The company focuses on a market segment that is considered strategic due to its high margins. This market segment is strictly controlled by laws and regulations affecting the finished product for the company's clients. Along the supply chain, the company offers a component used in the client's process; this component, however, does not reach the end-user as it is. While regulatory agencies have issued clear guidelines for downstream B2C finished products, the upstream components are not yet subject to regulation. At this stage, compliance with laws and regulations is contingent on their interpretation. Therefore, under this uncertainty, the company's competitors act differently through their already developed capabilities, ranging from a strict interpretation of the regulatory guidelines to a wait-and-see position leveraging on continuity with the past. In the meantime, clients carefully monitor regulatory agencies for clarifications in this case.

The company is concerned about the risk of failing in a mission-critical market segment and its commitment to achieving a maximum increase in shareholder business value. To pursue the highest business value, the company must match risk with business value and adjust the risk-taking level according to its risk inclination, *i.e.*, risk appetite. Furthermore, the assessment of the existing capabilities, in terms of the company's internal processes and competencies to properly cope with the uncertainty of the context, shows a relatively high organizational vulnerability related to the certification of the product, *i.e.*, the component used in the client's processes. This weakness mainly stems from the company's failure to build specific knowledge over time and its current lack of staff consistently dedicated to these issues. Such conditions affect the level of risk perceived by the company, thus producing a higher level of residual downside risk.

4.2 Risk-driven strategy formulation

The risk-driven strategy formulation process leads to the following considerations linked to the profitability of the market segment: at one end, the goal may be to make minimum investments in product compliance certification and maintain high margins; at the other end, the plan may be to invest in addressing product regulatory compliance, while lowering margins on sales. Here, as for many other similar strategic decisions within the business, the best fitting strategy can be identified by starting with a quantitative approach to risk and business value. The company set the following three strategies within the range of low, intermediate, and high-risk

levels. A low-risk strategy - strategy 1 - entails putting business deals on hold by communicating to clients the company's accountability for the issue and its potential implications and launching an internal task force to engage qualified external providers urgently. An intermediate-risk strategy - strategy 2 - requires undertaking consistent key competitor benchmark initiatives and establishing a business development plan to build compelling in-house product conformity competencies. Finally, a high-risk strategy - strategy 3 - means to push the sale process as usual by reassuring clients about looming regulatory changes and engaging a sales team to be proactive in determining regulatory developments and alerting the organization in such an event. These three levels of risk were identified and associated with the threat of selling products without the required compliance certification. Likelihood, vulnerability, and impact assessed these threats in terms of shrinking market share, reputational damage, fines, overhead costs, and disputes. From this perspective, the company treated likelihood as an exogenous variable since it is linked to the external environment. Given the possible approaching regulatory change, the likelihood was assessed as high throughout the rating range. Vulnerability and impact were instead assessed as varying from low to high levels. The least amount of risk to which the company was exposed, *i.e.*, the retention of products from the sales process would give the company an extremely low vulnerability to threats of regulatory change. The impact was also considered low since it would affect only quick profits. Thus, this was the most cautious profile under uncertain conditions (Figure 5, area of risk A). The most significant risk, *i.e.*, a product going through the sales process without adequate internal competencies and market oversight would make the company extremely vulnerable to regulatory change threats. The impact was considered high as well since it would damage the company not only in terms of profit setbacks but also in terms of endangered reputation, fines, and litigation. This scenario is the boldest profile under uncertain conditions (Figure 5, area of risk C). An intermediate position between the two extremes refers to medium levels of vulnerability and impact, which could have been achieved by staying ahead of regulatory change and preserving reputation from likely impactful consequences (Figure 5, area of risk B).



Note: Residual risk for the three regions on the x-axis – inadequate, optimum, and excessive risk – have been determined through vulnerability likelihood and impact parameters.

Figure 5 Risk Rating and Strategy formulation

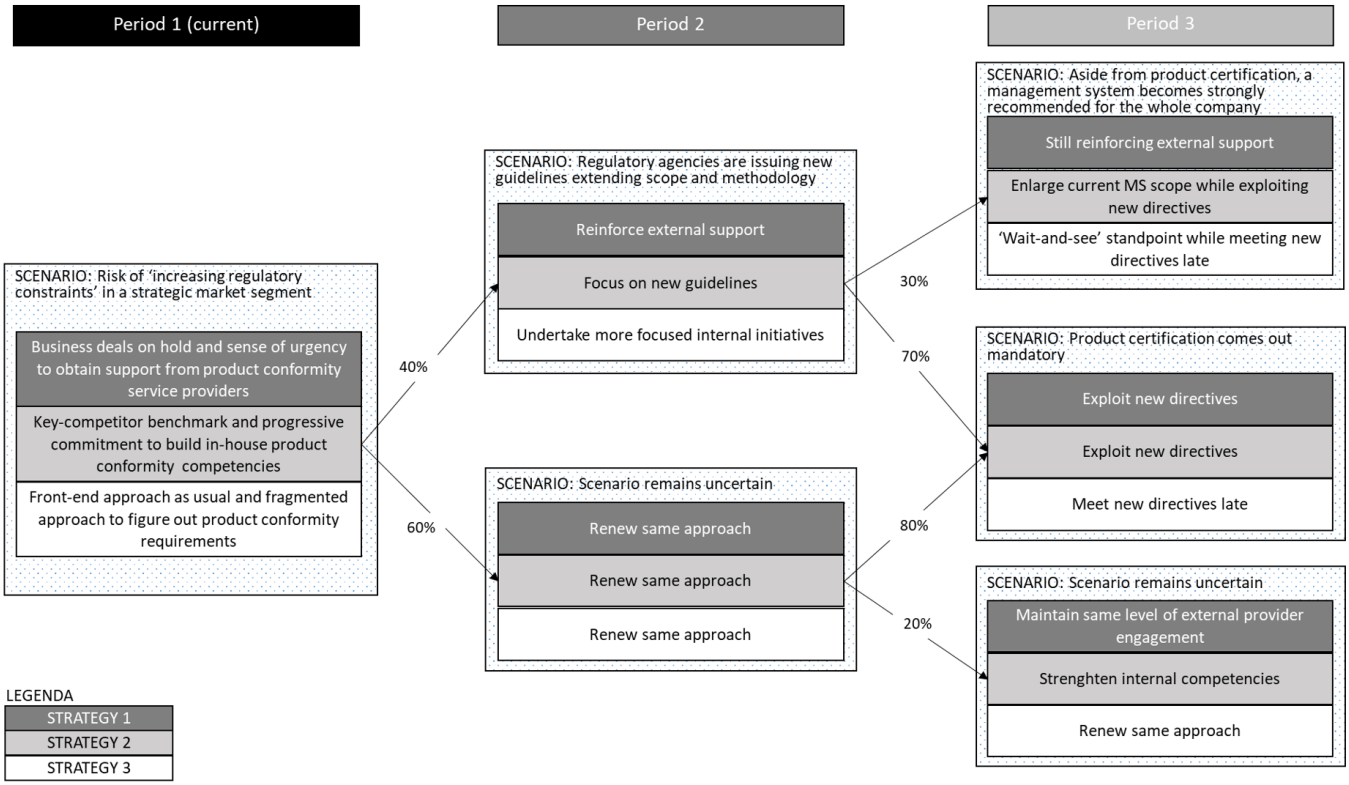
4.3 Real-options framework

Within an unpredictable context, the company monitored the uncertainty by undertaking a scenario analysis to consider various future viable external issues to set appropriate strategies. As reported in Figure 6, starting the analysis from the current period - period 1 -, the risk of increasing regulatory constraints in a strategic market segment can lead to two different scenarios with different likelihoods. These scenarios - addressed by the company executives - in period 2 are 1) regulatory agencies issuing new guidelines extending scope and methodology, with a likelihood of 40%; and 2) the scenario remains uncertain, with a 60% likelihood. From scenario 1, the evolution in period three can lead to 1.1) aside from product certification, a compliant management system becomes strongly recommended for the whole company, with a 30% likelihood; and to 1.2) product certification becomes mandatory, with a 70% likelihood. From scenario 2 of period 2, the evolution in period three can lead to 2.1) product certification becoming mandatory, with an 80% likelihood; and to 2.2) scenario remains uncertain at 20%.

According to the above-reported scenario analysis, Figure 6 contains the RO deployment of the three strategies. For example, strategy 1 responds to the scenario by providing new

guidelines extending scope and methodology and reinforcing external support. By contrast, strategy 2 focuses on new guidelines, and strategy 3 undertakes more focused internal initiatives.

It is worth noting that the two scenarios, "Regulatory agencies are issuing new guidelines extending scope and methodology" and "Scenario remains uncertain" in period 2, both lead to the "Product Certification outcome as mandatory" in period 3, but with different likelihoods.



Note: Strategies are deployed in strategic options for different scenario evolutions. Each strategic option is characterized by the likelihood of the corresponding scenario evolution.

Figure 6 Scenarios and strategies

Based on the RO network in Figure 4, the company determined the option value through the value-to-cost metric and the NPV metric (see Equation 1) for each strategic option. The value-to-cost metric arises from the differential profit outcome - *i.e.*, underlying asset value -, and the expected investments - *i.e.*, exercise price (see Equation 2). The NPV metric is calculated by combining t+1 option values and their associated likelihoods (see Equation 3).

To obtain a quantitative estimation of the business value of each strategy, the company weighted each option by providing forecasted values for the investments, differential profits, and options likelihood. In addition, to deal with the uncertainty, the company set appropriate statistical distributions for profits and likelihoods for all the strategies. Approaching the Montecarlo simulation for each strategy, the statistical distributions of profits and likelihoods are taken as inputs for the mathematical model built from the formulas of the RO scheme. The simulation produced the final value of the real-options network, *i.e.*, the business value for the current period, in terms of a Gaussian distribution. This process is replicated for the three strategies.

Thus, running Montecarlo simulations for Strategy 1 leads to a distribution of the real-options network value for the current period, ranging from approximately US$ -30k to US$ +65k. Through the same process, the distributions of the real-options network values are calculated for Strategy 2 and range from US$ +75k to US$ +195k. For Strategy 3, the real-options network values range from US$ +41k to US$ +66k (see Table 1).

4.4 Risk-driven strategies *vs.* business value

Figure 7 illustrates the statistical distributions for the business value of the three strategies obtained from the Montecarlo simulations. Strategy 2 is the most profitable, corresponding to the intermediate level of risk. However, this might not be the best among the three probability distributions regarding business value. If so, it would mean that the three strategies are not yet centered on the proper risk interval. For example, suppose results show that the low-risk strategy has the best business value. In that case, there would be a lower-risk strategy, which should be investigated and adequately assessed in economic terms.

Moreover, in other contexts, when statistical distributions may overlap more than in the current case study, a comparison between probabilities of the overlapping distributions can be discussed to reach the most appropriate decision.

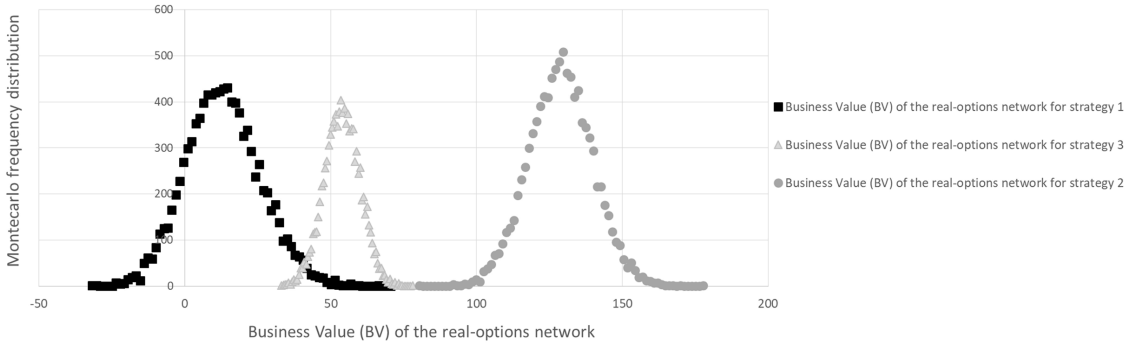
The above results emphasize the intermediate level of risk as the optimum risk area that the company should contemplate coping with the high uncertainty from the looming regulatory change in one of its strategic market segments.

Figure 8 summarizes the closing remarks above, showing that the lower risk is inadequate and the higher risk is excessive for the expected results. In detail, it illustrates the business value rating of the three strategies intersecting with the related residual risk rating. The risk-adjusted curve can be empirically drawn, connecting the three points. The company can leverage a compelling risk-driven strategy formulation process by identifying the optimum risk area through the business value rating of all strategies.

Table 1 Results of business value measurement for the three strategies

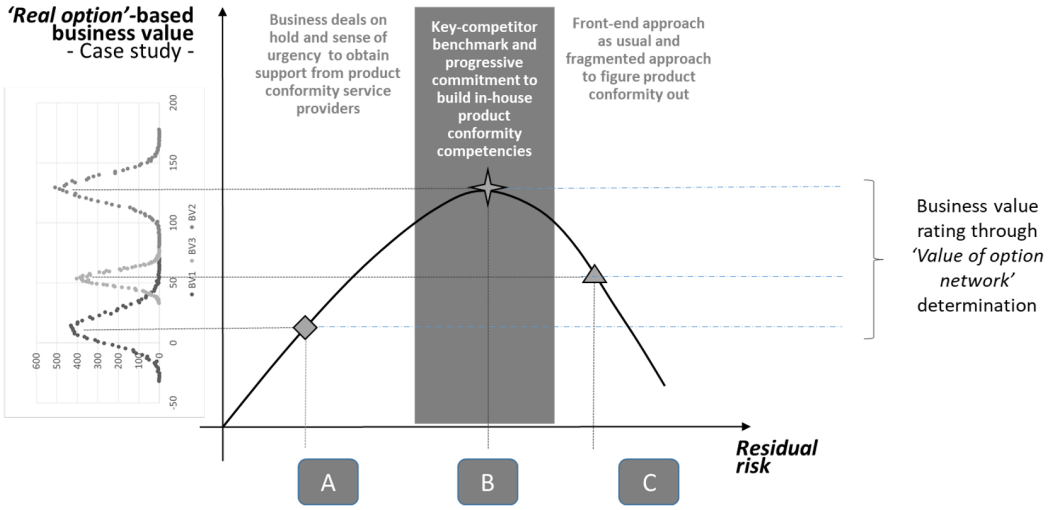
Time period =>	***Period 1 (current)***				***Period 2***					***Period 3***									
Possible scenarios=>	Risk of 'increasing regulatory constraints' in a strategic market segment				Regulatory agencies are issuing new guidelines extending scope and methodology			Scenario remains uncertain		Aside from product certification, a management system becomes strongly recommended for the whole company			Product Certification comes out mandatory				Scenario remains uncertain		
Economic dimensions=>	**Value of option network (Call Value)**	**NPV metric**	**Value-to-cost metric**	Exercise Price	Underlying Asset Value	likelihood	Exercise Price	Underlying Asset Value	likelihood	Exercise Price	Underlying Asset Value	likelihood	Exercise Price	Underlying Asset Value	likelihood	Exercise Price	Underlying Asset Value	likelihood	Exercise Price	Underlying Asset Value
(S.O. = Strategic Option)																			
Strategy 1 *Business deals on hold and sense of urgency to obtain support from product conformity service providers*	**-30 k$ ÷ +65 k$**	**+30 k$ ÷ +125 k$**	**-60 k$**	-60 k$	0 $	S.O. 1 Reinforce external support			S.O. 2 Renew same approach				S.O. 1.1 Still reinforcing external support			S.O. 1.2 and S.O. 2.1 Exploit new directives			S.O. 2.2 Maintain same level of external provider engagement		
						40%	-80 k$	0 $	60%	-60 k$	0 $	30%	-80 k$	+150 k$	From S.O. 1 70% / From S.O. 2 80%	-10 k$	+150 k$	20%	-50 k$	0 $
Strategy 2 *Key-competitor benchmark and progressive commitment to build in-house product conformity competencies*	**+75 k$ ÷ +195 k$**	**+95 k$ ÷ +215 k$**	**-20 k$**	-20 k$	0 $	S.O. 1 Focus on new guidelines			S.O. 2 Renew same approach				S.O. 1.1 Enlarge current MS scope while exploiting new directives			S.O. 1.2 and S.O. 2.1 Exploit new directives			S.O. 2.2 Strenghten internal competencies		
						40%	-30 k$	0 $	60%	-20 k$	0 $	30%	-30 k$	+150 k$	From S.O. 1 70% / From S.O. 2 80%	-10 k$	+150 k$	20%	-10 k$	0 $
Strategy 3 *Front-end approach as usual and fragmented approach to figure out product conformity requirements*	**+41 k$ ÷ +66 k$**	**+1 k$ ÷ +26 k$**	**40 k$**	-10 k$	50 k$	S.O. 1 Undertake more focused internal initiatives			S.O. 2 Renew same approach				S.O. 1.1 'Wait-and-see' standpoint while meeting new directives			S.O. 1.2 and S.O. 2.1 Meet new directives late			S.O. 2.2 Renew same approach		
						40%	-30 k$	50 k$	60%	-10 k$	50 k$	30%	-10 k$	0 $	From S.O. 1 70% / From S.O. 2 80%	-10 k$	0 $	20%	-10 k$	0 $

Note: The analysis covers three periods, includes information about likelihood, exercise price, and underlying asset value for each option, and returns the value of the real-options network, which represents the parameter for strategy evaluation.



Note: The simulated distributions of the business value of the three strategies are compared on the same axis to support their choice. The X-axis shows the business value range according to the RO methodology and Montecarlo simulation, while the Y-axis is the frequency distribution of the business value obtained from the Montecarlo simulation.

Figure 7 Comparison of the statistical distributions of the real-options network Business Value (BV)



Note: The figure illustrates the business value rating of the three strategies crossing with the related residual risk rating. The curve of the adjusted risk for increasing regulatory constraints in a strategic market segment can be empirically traced, striking the three regions of inadequate (A), optimum (B), and excessive (C) risks.

Figure 8 Quantitative approach to risk-based strategy formulation

5 Conclusion

By gathering data on the case-study decision-makers committed to strategy formulation under deep industry uncertainty and using the RO logic, this paper sheds light on the strengths of the RO framework in practice, in conjunction with the Montecarlo method.

The thesis advocated by this paper relies on the collected evidence that quantitative and analytical approaches to the business value *vs.* risk relationship can effectively support company strategy formulation processes. Indeed, the case study confirmed that matching risk with business value and adjusting the risk-taking level according to the company's risk appetite is an effective management practice to pursue the highest business value. In addition, the adopted inductive-empirical methodology proved that a quantitative approach to risk and business value triggers the best appropriate strategy within uncertain business scenarios. In this respect, the case-study company leveraged a compelling risk-driven strategy formulation process by identifying the optimum risk area through the business value rating of its viable strategies. Concerning the risk-driven strategy formulation process, the research aim of identifying supportive quantitative tools showed that the RO framework, in conjunction with the Montecarlo method, is a valuable tool capable of supporting the best strategy formulation by purposefully connecting risk with business value. Furthermore, the RO framework can maximize business value in markets characterized by fundamental uncertainty about future outcomes.

These case-study results interest scholars focusing on strategic thinking research and practitioners shaping strategic risk management practices within their reference industry. From the scholars' perspective, this paper advocates that, through the RO lens, strategy formulation is a process of organizational resource-investment choices. Therefore, by seeing the strategy as a portfolio of real-options, strategic thinking research can leverage the quantitative link between risk and business value to empower strategic risk management theories and models. From the practitioners' perspective, exploring strategic scenarios using RO and the Montecarlo method can lead to strategy-setting processes and trigger ERM frameworks to become a comprehensive governance discipline. In this respect, this article substantially contributes to the evolving risk management practices deployed by companies in many industrial sectors. When deploying ERM, one of the most crucial challenges is configuring the link between the risk-taking level and business value creation to empower the decision-making and strategy-setting processes. By determining the most valuable match between risk and value, companies can trigger competitive approaches to cope with scenarios presenting deep uncertainties. Analytical, quantitative tools such as those introduced by this paper, *i.e.*, RO and Montecarlo, underpin a shift in the ERM maturity level. It passes from a downstream strategy-setting process, where ERM practices support a company's goal achievement, to an upstream one, where they lead strategy formulation. In addition, from a value-creation perspective, leveraging risk upfront allows companies to operate at risk-taking levels always consistent with their predisposition to risk or their risk appetite, *i.e.*, the amount of risk they agree to take while pursuing business goals.

With such knowledge, future studies can focus on improving the usefulness of RO logic and

making it more accessible to firms and managers dealing with uncertainty.

Regarding the generalizability of research results, these findings can be considered to have a broader scope and be an impactful extension to different industries. The RO framework is suitable for application to most company contexts and is valuable in fostering a strategic scenario valuation of individual case projects and business unit levels.

Finally, as far as the study's limitations are concerned, they refer to researcher bias. Since the researchers played a vital role in the reviewed case study, they recognized the potential biases and ethically handled them.

Conflict of interest

The corresponding author states that there is no conflict of interest on behalf of all authors.

Author's contribution

Both authors contributed to the study's conception and design and performed material preparation, data collection, and analysis. Both authors read and approved the final manuscript.

Ethical consent

Ethical consent was obtained to perform the study with permission from the case-study company to access all materials required and report findings anonymously. Meetings and discussions were conducted by way of face-to-face meetings, online meetings, and email discussions.

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