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Full Length Research Paper

Entrepreneurship in crisis situations: Determinants of entrepreneurial intentions among University Students in Yemen

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The aim of this study was to examine the entrepreneurial intentions of university students at two major universities in Yemen. The entrepreneurial intentions of students were determined using demographic, personality, environmental and situational variables. The primary data were collected through a questionnaire survey method. A total of 487 students have been included from different programs such as economics, commerce, sciences, computer and IT, medical sciences, agriculture, engineering, art and law. To analyze the data, descriptive statistics, principal component factor analysis, t-test, analysis of variance, correlation and regression analysis were employed. The results indicate that individual perceptions of need for achievement, self-efficacy, locus of control and situational variable have a significant impact on entrepreneurial intention, but not instrumental readiness. Age and entrepreneurial experience have a significant impact, but not gender and university. The study recommends that students should develop their entrepreneurial capacity by following informal and formal training of different entrepreneurial skills needed to run a business. Government and universities should organize entrepreneurship training courses and establishing entrepreneurship centers, incubators and support entrepreneurial start-ups activity.

Key words: University students, entrepreneurial intention, Yemen.

INTRODUCTION

Across the globe, entrepreneurship has been recognized as a viable determinant for progress and economic growth. As one of the basic impulsive forces of economic development, entrepreneurship and small and new firms have contributed significantly by attaining economic growth, high employment, creation of strong job opportunities, positive social change, providing support to the domestic economy and recovering from conflict (Acs et al., 2004; Fayolle et al., 2006; Djip, 2014). Over the last decade, extensive studies have been conducted on entrepreneurship and economic growth within strong and stable environments (Giacomin et al., 2011; Kwong and Thompson, 2016). With about 1.5 billion people affected by conflicts all over the world (World Bank, 2011), the

empirical work is still relatively little in studying entrepreneurship issues in hard and crisis situations, particularly political and economic instability (Aldairany et al., 2018). Conflict and crises are considered one of the most critical challenges facing entrepreneurship in the world today. These challenges vary in each country or case, therefore, in those different contexts, they have their special issues. To study this issue, many previous studies have depended on qualitative methods with small and non-random samples in some cases, whereas some others depended on the published households' surveys. However, there is still a critical need for empirical research on business and entrepreneurship intentions in such challenging contexts. Furthermore, entrepreneurship may be a part of the solution which refers to the recovery ability in the impact of crisis, where the need to earn some income for people who stay in crisis zones may play catalyst roles in moving towards stability. In crisis situations, many entrepreneurs may seek to do business to survive and sustenance their families. In contrast, the crisis contexts are linked with weak of the business environment in general. Therefore, this paper aims to contribute to filling this research gap by empirically analyzing the factors that impact the entrepreneurial intentions among university students in a unique socio-economic context. On one hand, it clearly considers the relationship between the crisis effect and the entrepreneurial intentions of university students. Doing so, it implicitly considers the impact of entrepreneurship education on shaping students' entrepreneurial intentions. On the other hand, the study does not restrict investigation to social entrepreneurship, but all entrepreneurial activities. This can shape our understanding and knowledge on this important issue, in order to formulate tailored policies catering to the particular needs of crises case.

Country profile

The ongoing conflict in Yemen has wrought grievous costs on the nation, damaging lives, property, and devastated the country's essential infrastructure and a majority of production activities ceased since March 2015. The country had sunk to the bottom of the United Nations Development Program and Human Development Index (HDI) (Moyer et al., 2019). According to recent figures published by the World Bank, Yemeni GDP contracted by an accumulated 39% in the period between 2014 and 2019 (World Bank, 2019). Furthermore, the crisis has dramatically diminished employment and income opportunities in the private and public sector, that led towards losing many job opportunities and making the unemployment rate doubled (14.6%) in the year 2010. A report from the International Labor Organization (ILO) indicates that the unemployment rate among Yemeni youth in the 15-34 age group is high and it was estimated at 79.3% (ILO, 2015).

Entrepreneurship in Yemen

In Yemen, entrepreneurship and Micro, Small and Medium-size Enterprises (MSMEs) are closely related, where the small and new firms have contributed significantly by new job creation. In that way, it helped to address one of the main problems facing young people, especially university graduates and provided support to the local economy. The private sector in Yemen provides many opportunities for self-employment. According to the Baseline Survey of Micro and Small Enterprises carried out in 2000, the number of SMEs is estimated at 311,000 firms, which employ around 500,000 private-sector-workers, out of which 224,000 are individual firms, constituting 72% of the total (MSE Survey Baseline, 2000). Adding to the above, MSEs are the main source of income for 70% of MSE entrepreneurs (Aliriani, 2013).

LITERATURE REVIEW

Entrepreneurial intention concept

The term Entrepreneurial Intention is considered synonymous with entrepreneurship. Most of the studies use entrepreneurial intention as a tool for measuring the level of entrepreneurship activity. Entrepreneurial intention has been defined in different ways: as a mental state that inspires a person to a specific path (Bird and West, 1998), the intention of a person to start-up a new business venture at some point in the future (Thompson, 2009), the intention of a person to own a business (Crant, 1996), the intention of a person to be self-employed (Douglas and Shepherd, 2002). Entrepreneurial intention has a psychological nature. According to Ajzen (1991) and Krueger et al. (2000) the intention has proven as the best predictor of an individuals' planned behavior, especially when the behavior is rare and hard to observe or involves an unpredictable amount of time. The stronger an individuals' intention to engage a given behavior, the more likely to perform this behavior (Maresch et al., 2016). In the current study context, entrepreneurial intention can be defined as the intention of a person to start-up a new business venture for the main purpose of profit-seeking at some point in the future.

Entrepreneurial intention models

The development of the models that explain the entrepreneurial intention is credited to the eighties and nineties of the last century. Shapero and Sokol (1982) is one of the earliest scholars who developed a model of the Entrepreneurial Event (EEM). According to EEM model, there are three variables that determine entrepreneurial intention. Perceived desirability (the individual attractiveness of starting a business), perceived feasibility (the confidence a person has in their

ability to start a business) and entrepreneur's tendency to act (refers to individual's disposition to act decisively when faced with an opportunity). Ajzen (1991) developed a psychological model of "Planned Behavior", the Theory of Planned Behavior (TPB). Ajzen suggests three motivational factors that influence entrepreneurial intention. These factors are attitudes towards the behavior (the degree to which an individual has a favorable or unfavorable evaluation or appraisal of the behavior in question), subjective norms (the perceived social pressure to perform or not to perform the behavior) and behavioral control (the perceived easiness or difficulty of performing the behavior). Recently, TPB is becoming one of the main theoretical models frequently used to explain and predict human behavior.

Around these two complementary models, most works dealing with entrepreneurial intention has been developed. In one hand, the EEM is particularly applied to entrepreneurial behavior; on the other, the TPB is more general and refers to a wide range of behavior. However, both models confirm the importance of a person's behavioral intention as a predictor of a person's real behavior.

Davidsson (1995) introduced an economic-psychological model to test factors that affect an individual's intentions to start business. The model combines economic and psychological variables in a set of general attitudes (desire to change, competitiveness, money orientation, achievement, and autonomy), domain attitudes (payoff, social contribution and know-how), and the current situation. According to Guerrero et al. (2008), Davidsson's model considered as the last formal accredited entrepreneurial intention model was published in 1995. However, Lüthje and Franke (2003) later suggest a structural model dedicated to explore the effect of contextual and personality factors on entrepreneurial orientation. Thus, for the purpose of this study Davidsson (1995) model was borrowed.

Theoretical model

The theoretical model of this study comprises four predictors of entrepreneurial intention. The four predictors are some personality traits (need for achievement, locus of control and self-efficacy), some environmental factors which are supporting nascent entrepreneurial activities (access to capital, access to business information, institutional environment and social networks) and demographic variables which are usually significantly associated with entrepreneurial intention such as age, student's gender, university and prior entrepreneurial experience. In addition, this study makes a significant contribution to entrepreneurship literature by adding a situational variable that interacts with individual perceptions to influence entrepreneurial intentions. In entrepreneurial intention models, relatively little research interest was devoted to a situational variable. Davidsson

(1995) is one of the authors who examine how the situational variable, unemployment status, has an impact on entrepreneurial intentions in the Norwegian context. Recently, entrepreneurship research highlighted the importance of the situational variables on shaping entrepreneurial intention. Arrighetti et al. (2016) take the impact of situational variable, the economic crisis, on the entrepreneurial intentions of university students in the Italian context. Mouselli and Khalifa (2017) determined the effect of a situational factor and crisis effect, on university students during the Syrian war. The current study hopefully has been able to initiate more interest towards the impact of the situational factor, crisis effect, in the entrepreneurial intentions of university students in the Yemen context. Figure 1 shows the entrepreneurial intentions model in this paper.

Variables definition

Personality traits

There is a growing body of literature arguing that the entrepreneur personality traits and attitudes play a very relevant role in the decision to start a new business (Kristiansen and Indarti, 2004; Sesen, 2013; Mat et al., 2015; Çolakoğlu and Gözükara, 2016; Mouselli and Khalifa, 2017) The present study focuses on the most commonly used which are: Need for achievement, Locus of control and Self-efficacy.

Need for achievement

One of the most widely used psychological variables in personality traits and entrepreneurship research is the need for achievement, it shows whether an individual is inclined to entrepreneurship or not (Frank et al., 2007). It is more associated with performance compared with an individual's internal standards (Davidsson, 1995). According to Need for Achievement Theory by McClelland (1961), individuals with a high need for achievement have a strong desire to be successful. He also assures the importance of the achievement motivation for economic development. Hansemark (1998) noted that the founders of new firms have a higher level of need for achievement. Some prior research shows a positive relation between need for achievement and entrepreneurial intention (Gürol and Atsan, 2006; Çolakoğlu and Gzükara, 2016). However, this is in contrast with the findings of a recent study carried out by Sharaf et al. (2018) who reported that the need for achievement has no significant impact on entrepreneurial intention.

Locus of control

Another personality trait that dominates entrepreneurship research is locus of control. It is the overall belief in a
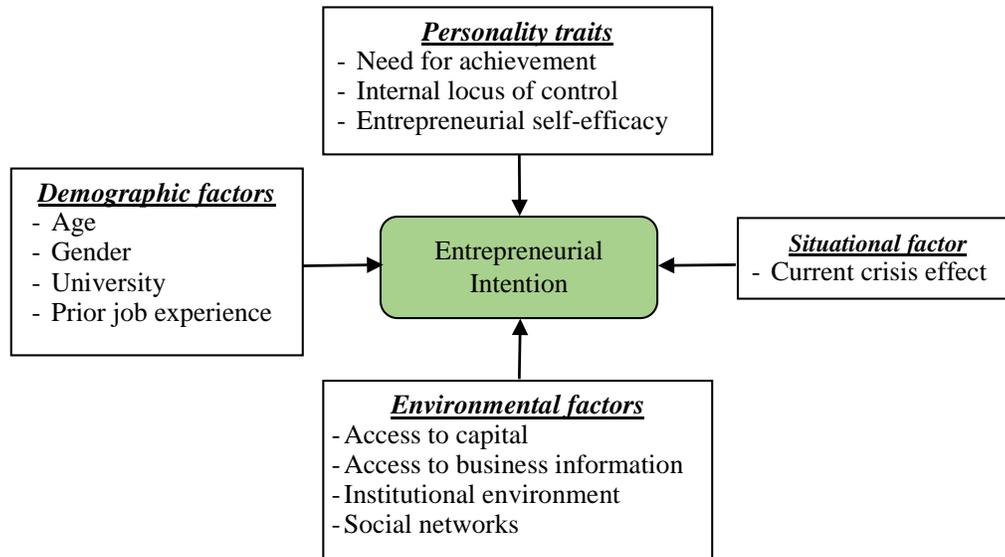
Figure 1. Shows the conceptual model of intention.

person's power over the outcomes of actions. According to Locus of Control Theory by Rotter (1966) the individuals more internally oriented are more propensity to believe that reality can be affected by their efforts. In contrast, those who are more externally oriented believe in the power of external conditions. Locus of control considered to be important in individuals' motivation and intentions to start new ventures (Shane et al., 2003). Remeikiene et al. (2013) reported that education mostly contributes to the development of internal locus of control. The results of a number of studies found, that locus of control predicts entrepreneurial intention (Gerba, 2012; Sesen, 2013). However, Kristiansen and Indarti (2004) and Fayolle et al. (2006) found that the locus of control has no significant effect on entrepreneurial intention.

Self-efficacy

The third personality trait in the present study is self-efficacy which is defined as the degree to which individuals believe they have the ability to successfully start a business (Malebana, 2017). In the field of entrepreneurship, it is related to entrepreneurial intention and termed "entrepreneurial self-efficacy" (ESE). Self-efficacy is a great driver of goal-oriented behavior (Baum and Locke, 2004). It is the core of the EEM model, the entrepreneurial intention is derived from desirability, feasibility, and propensity to act. Self-efficacy is also in the center of TPB, it represents the perceived behavioral control. The entrepreneurial intention tends to be affected by self-efficacy. Subsequent research has shown that self-efficacy is a significant factor to pursue entrepreneurial intention decision (Sesen, 2013). Within this framework defined by previous literature, three

research hypotheses were formulated to be empirically tested concerning personality traits:

H1: Need for achievement has a positive impact on entrepreneurial intentions.
H2: Internal locus of control has a positive impact on entrepreneurial intentions.
H3: Self-efficacy has a positive impact on entrepreneurial intentions.

Environmental factors

In addition to personality traits, other factors associated with environment can be important sources of entrepreneurial intentions. Environmental factors are often viewed as filling the gap in relation between personality traits and entrepreneurial intentions (Lüthje and Franke, 2003). Previous studies included a large set of environmental factors that might influence the decision to begin an entrepreneurial career (Sesen, 2013). In some contributions, access to capital is found to be an important antecedent for the creation of a new venture (Jemal, 2017), availability of information on the potential business sector and the social networks (Kristiansen and Indarti, 2004), and impact of institutional factors (Mouselli and Khalifa, 2017).

Access to capital

One of the issues related to entrepreneurship in general and especially among the youth generation is access to start-ups financing. According to Jemal (2017) the lack of start-up capital and the constraints of financial systems

considered as the most serious challenge for youth generation to think about launching their own business.

Access to business information

The availability of information on the business environment such as, markets, sources of inputs, technological solutions, government regulations and rules and how to run a business. According to Kristiansen and Indarti (2004), access to information is an important element for the intention to launch new ventures. Previous study by Anand and Krishna (1994) found that information-seeking is the main characteristic of entrepreneurial.

Institutional environment

Institutional environment plays a powerful role in creating or even destroying entrepreneurship in a country (Aldrich and Wiedenmayer, 1993). The rate of launch new ventures is directly affected by ease or difficulty of establishing businesses in terms of procedures and requirements to obtain a license, where it can influencing pursue the entrepreneurial activity. According to Stephen et al. (2005) environmental formal variables such as legal rules and government support procedures are critical to launching new ventures.

Social networks

Social networks can be defined as a variety of channels, such as family, relatives, friends, or social groups in general. Social networks are important to establish an entrepreneurial venture. It is a way for entrepreneurs to receive information and support. According to Sesen (2013) some social networks may provide financial support, others provide the information for new entrepreneurs. He also pointed out the importance of support from the social networks on a person's intention to be an entrepreneur.

The major environmental variable used is "Instrumental Readiness". Based on prior study of Kristiansen and Indarti (2004) the current study considers that individuals' perception of their access to capital, access to business information, institutional environment and social networks as one factor with a combined measurable impact on entrepreneurial intentions, and the following hypothesis has been developed:

H4. Instrumental readiness has a positive impact on entrepreneurial intentions.

Crisis effect

It is a country-level predictor related to the current

situation in the study context, specifically the influence of the current status. It is considered one of the situational variables that expected to affect the entrepreneurial decision (Davidsson, 1995; Arrighetti et al., 2016; Mouselli and Khalifa, 2017). The decision to launch a new business is not independent of the social, political and economic environment conditions where the new business will be operating (Lüthje and Franke, 2003; Turker and Selcuk, 2009). In times of crisis, the features of the economic environment get worse. As a result, a negative effect should be expected on the actual rate of new business creation (Klapper and Love, 2011); thus, the current crisis is expected to have a negative impact on entrepreneurial intention. The reason is due to the financial, economic, political, social even psychological constraints imposed by the crisis as well as the shrinking of business opportunities. In contrast, entrepreneurship may push some individuals to become necessity-based-entrepreneurs, where the wage employment opportunities are limited. In developing countries, many nascent entrepreneurs engaged in entrepreneurial activities are driven by necessity (Arrighetti et al., 2016; Mouselli and Khalifa, 2017). In contrast, the crisis might limit the financial resources available and damage individuals' psychological, social and mental conditions. However, this variable has yet to be thoroughly examined in the entrepreneurial intention literature. This study aims to make a contribution with respect to the above literature and investigate the effect of the current crisis on entrepreneurial intentions, Yemen context. Thus, the following hypothesis was proposed:

H5. The current crisis has a negative impact on entrepreneurial intentions.

Aim of the study

This study aims to study the impact of some personality traits on entrepreneurial intentions, to assess the influence of environmental factors on entrepreneurial intention and to comprehend the impact of the situational factor "crisis effect" on the entrepreneurial decision.

METHODOLOGY

Data collection tool

The aim of this research was to investigate the factors that impact the entrepreneurial intention among university students in Yemen. The primary data was collected through a questionnaire. The researchers designed Entrepreneurial Intention Questionnaire (EIQ) following various questionnaires already tested by previous authors (Mueller and Thomas, 2001; Kristiansen and Indarti, 2004; Liñán and Chen, 2009; Mouselli and Khalifa, 2017). All EIQ items are measured using a five-point Likert scale from 1 (lowest measure) to 5 (highest measure). EIQ consists of two parts. The first part contained the demographic information (age, gender, university and entrepreneurial experience). The second part was related to the scales and items that target the purpose of the study. Table 1

Table 1. Entrepreneurial Intention Questionnaire (EIQ) items and the source of adoption.

Constructs and measuring items	Sources
Need for achievement (NA)	**Kristiansen and Indarti (2004)**

Rate yourself to what extent your performances will be better than others or than previous one's own from 1 (strongly disagree) to 5 (strongly agree)

NA1: I will do very well in fairly difficult tasks relating to my study and my work.
NA2: I will try to succeed and perform better than my friends.
NA3: I will seek added responsibilities in job assigned to me.
NA4: Current situation motivates me for more achievement*.

Locus of Control (LC)	**Mueller and Thomas (2001)**

Rate yourself to what extent you feel have the power to control the outcomes of actions from 1 (strongly disagree) to 5 (strongly agree)

LC1: Diligence and hard work usually lead to success.
LC2: If I do not succeed on a task, I do not give up.
LC3: I do not believe in luck in the job.
LC4: I am fairly managing my financial situation.
LC5: I am a good time-manager.
LC6: I am able to start and run a new business during the crisis period*.

Self-efficacy (SE)	**Liñán and Chen (2009)**

Rate yourself to what extent you feel have the ability to start a business from 1 (strongly disagree) to 5 (strongly agree)

SE1: I have leadership skills that are needed to be an entrepreneur.
SE2: I have mental maturity to start to be an entrepreneur.
SE3: I have the skills and abilities required to succeed as an entrepreneur.
SE4: I have the experience to start my own business.

Instrumental Readiness (IR)	**Kristiansen and Indarti (2004)**

Indicate your level of agreement that the following measures could be a barrier or incentive for you to launch your own business from 1 (extremely unsupportive) to 5 (extremely supportive)

IR1: Access to capital to start a business
IR2: Access to supporting information to start a business.
IR3: The administrative bureaucracy in the procedures of registering and running firms(e.g., paperwork and long delays, etc.)*.
IR4: Essential infrastructure (e.g., transportation, water, electricity, telephone, and other telecommunication systems, etc.)*.
IR5: The available labor forces required to start a business*.
IR6: Social networks if I decide to be an entrepreneur.

Crisis Effect (CE)	**Mouselli and Khalifa (2017)**

Rate yourself to what extent the current crisis affected the status of your financial, psychological, social and to what extent the crisis limited the necessary resources to start up a new venture from 1(strongly effect) to 5 (Never affect)

CE1: My financial situation has been affected dramatically by the crisis.
CE2: My psychological situation has been affected dramatically by the crisis.
CE3: My social situation has been affected dramatically by the crisis.
CE4: Crisis restricts resources that are necessary to start up business.

Entrepreneurial Intention (EI)	**Liñán and Chen (2009)**

Rate yourself on the following questions from 1 (strongly disagree) to 5 (strongly agree)

EI1: I am ready to do anything to be an entrepreneur.
EI2: My professional goal is to be an entrepreneur.
EI3: I will make every effort to start and run my own business.
EI4: I am determined to create a business venture in the future.

Items with an asterisk are self-developed.

Table 2. Sample distribution by gender, age, university and entrepreneurial experience ($N = 487$).

Variable	Category	Frequency	Percentage
Gender	Male	349	71.7
	Female	138	28.3
	22-23	181	37.2
Age (year)	24-25	232	47.6
	≥26	74	15.2
University			
Sana'a University	Public	363	74.5
University of Science and Technology	Private	124	25.5
Prior entrepreneurial experience	Yes	53	10.9
	No	434	89.1

lists the EIQ items along with their sources of adoption. EIQ was administered during class sessions.

Statistical approach

The collected data were analyzed by means of SPSS version 22 software using a set of approaches. Descriptive statistics in the form of frequencies, exploratory factor analysis and reliability analysis to help evaluate the goodness of the measure. Correlation analysis was used to check the validity of the conceptual framework. Independent Sample t-test and One-way ANOVA analysis were used to analyze the impact of demographic differences on entrepreneurial intention. Regression analysis was done to test the impact of predictor variables on entrepreneurial intention of students.

Participants, procedures and sample size

The population of this study was final year university students in Sana'a University and University of Science and Technology in Yemen, in 2019/2020 academic year. Both universities had 16 similar and different humanitarian and scientific faculties. Randomly, 8 faculties (50%) were selected to be considered as the research population, which are, faculties of commerce and economics, sciences, computer and IT, law, agriculture, medical sciences, engineering and art. Furthermore, the administration of these two universities was contacted to seek permission and assistance with on-site data collection. The class representatives were also contracted to seek assistance with on-site data collection. The size of the population was approximately 7667 university students. The stratified sampling technique was employed and the required sample size was determined based on the formula given by Thompson (2012)

$$n = \frac{N \times p(1-p)}{(N-1)(d^2 \div z^2) + p(1-p)}$$

Where n = Required sample size, N = Population size, Z = Confidence level at 95% (1.96), d = Error proportion (0.05), p = Probability (50%). A total of 555 questionnaires were distributed to students. Out of this, 487 were finalized and returned (Males = 349, Females = 138) from both universities, (74.53% = 363) Sana'a University and (25.47% = 124) University of Science and Technology, with the response rate (87.74%). The age distribution of the participants ranged from 22 to 27 years. The mean age was

24.11 (SD = 1.20). Whereas 89.1% = 434 of the total respondents have no prior entrepreneurial experience, 10.9% = 53 of them have (Table 2).

DATA ANALYSIS AND RESULTS

Factor analysis and reliability calculation

To ensure construct validity, exploratory factor analysis was run using the principal component analysis method with Varimax rotation to examine the structure of predictor factors measures in entrepreneurial intention used in the study. After performing factor loadings, each item with a loading value below 0.30 was deleted. Based on factor analyses, six factors were arising with the Eigenvalues above 1.0, these six factors altogether explained a total of 66.617% of the variance. Cronbach's α coefficients were used to check the reliability of the generated factors. The reliability values of all the factors were acceptable above 0.81 in every case (Table 3).

Kaiser–Meyer–Olkin test

To ensure an appropriate factor analysis result, the Kaiser-Meyer-Olkin (KMO) was tested to measure the sampling adequacy, with a result of 0.888, and a significant value (0.000) for Bartlett's test of sphericity. It can be concluded that factor analysis result is appropriate for this data (Table 4).

Mean, standard deviations, and correlation between study variables

Table 5 shows the descriptive statistics and correlations between the study variables. The mean values indicated that all the variables have moderate to moderately high values. The instrumental readiness variable got the lowest means (2.88). In general, the correlations between

Table 3. Rotated component matrix and reliability.

Variable	Item	Component					
		1	2	3	4	5	6
Need for achievement	NA3	0.812					
	NA2	0.686					
	NA1	0.664					
	NA4	0.638					
Locus of Control	LC3		0.796				
	LC4		0.753				
	LC1		0.677				
	LC5		0.671				
	LC2		0.631				
	LC6		0.542				
Self-efficacy	SE4			0.752			
	SE2			0.752			
	SE3			0.724			
	SE1			0.713			
Instrumental readiness	IR1				0.893		
	IR5				0.882		
	IR4				0.767		
	IR2				0.732		
	IR3				0.722		
Crisis effect	CE2					0.860	
	CE3					0.816	
	CE1					0.790	
	CE4					0.729	
Entrepreneurial Intention	EI1						0.814
	EI3						0.777
	EI2						0.768
	EI4						0.760
Eigenvalue		8.089	3.271	2.645	1.628	1.248	1.105
Variance explained (66.617%)		13.024	12.656	11.255	10.422	9.865	9.395
Cronbach's α		0.850	0.843	0.848	0.866	0.818	0.849

Extraction method: principal component analysis; rotation method: Varimax with Kaiser normalization.

Table 4. Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity.

KMO and Bartlett's test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.888
Bartlett's test of sphericity	Approx. x^2	7163.547
	df	351
	Sig.	0.000

the dependent variables and the independent variable were significant. More specifically, the relationships between entrepreneurial intention and need for achievement was high ($r = 0.53$, $p < 0.01$), while the relationship between entrepreneurial intention and instrumental readiness was low ($r = 0.10$, $p < 0.05$).

Table 5. Mean, standard deviations and correlation among the study variables.

Variable	Mean	SD	NA	LC	SE	IR	CE	EI
NA	3.5749	.57290	1.00					
LC	3.4541	.54091	0.645**	1.00				
SE	3.2562	.68697	0.591**	0.580**	1.00			
IR	2.8875	.68995	0.173**	0.185**	0.260**	1.00		
CE	3.5108	.65852	0.038	-0.015	-0.079	-0.065	1.00	
EI	3.7023	.58589	0.533**	0.463**	0.470**	0.101*	0.133**	1.00

The variables label as follows: NA - need for achievement; LC - locus of control; SE - self-efficacy; IR - instrumental readiness; CE - crisis effect; EI - entrepreneurial intention. Significant at: *p < 0.05; **p < 0.01.

Table 6. *T-test* for assessing the impact of gender, entrepreneurial experience and university on entrepreneurial intentions.

Variable	*t*	df	Sig.
Gender	-0.187	485	0.852
Prior entrepreneurial experience	7.257	485	0.000***
University	0.591	485	0.555

Significant at: ***p < 0.001.

Table 7. Analysis of Variance (ANOVA) for assessing the impact of age on entrepreneurial intentions.

Variable	*F*	df	Sig.
Age	28.388	2	0.000***

Significant at: ***p < 0.001.

The impact of demographic differences on entrepreneurial intention

In order to investigate the impact of differences on statistical demographic variables on entrepreneurial intentions, Independent Sample *t-test* was applied for gender, university and prior entrepreneurial experience. One-way ANOVA analysis was utilized for the variable of age. The results of *t*-test for the independent samples (Table 6) indicate that there is no significant difference between gender and entrepreneurial intention. This implies that the levels of entrepreneurial intention amongst male and female students are equal. This finding is consistent with past work of Smith et al. (2016), that students' entrepreneurial intentions were not influenced by differences of gender. The results also showed no significant differences in entrepreneurial intentions among students from public and private sector universities. This result is supported by Mouselli and Khalifa (2017). Nevertheless, there was a significant impact of prior entrepreneurial experience on entrepreneurial intentions ($t = 7.257$, df = 485, p < 0.000).

This finding agrees with the study conducted by Peng et al. (2012) that the prior entrepreneurial experience has an impact on entrepreneurial competence.

Analysis of variance (ANOVA) was utilized to investigate the impact of age differences on student's entrepreneurial intentions. The results (Table 7) explain that age was a significant impact on entrepreneurial intentions. This is demonstrated by a significant value (0.000). As the students were getting older, their entrepreneurial intention increases. This is in line with the findings of Ozaralli and Rivenburgh (2016).

The impact of predictor factors on entrepreneurial intention

Multiple regression analysis was used to investigate the impact of five predictor variables, namely, need for achievement, locus of control, self-efficacy, instrumental readiness and crisis effect on student's entrepreneurial intention. As shown in Table 8 the significant and positive impact of all personality traits, need for achievement, followed by self-efficacy and locus of control on entrepreneurial intention of students. Thus, *H1*: need for achievement has a positive impact on entrepreneurial intentions is supported. Similarly, *H2*: internal locus of control has a positive impact on entrepreneurial intentions and *H3*: self-efficacy has a positive impact on entrepreneurial intentions are supported as well. This result is consistent with the study of Mat et al. (2015), who report that the most personality traits drive entrepreneurial intention was need for achievement,

Table 8. Multiple regression analysis.

Variable	Estimate (β)	p-value
Need for achievement	0.310	0.000***
Locus of control	0.140	0.006**
Self-efficacy	0.224	0.000***
Instrumental readiness	-0.028	0.466
Crisis effect	0.139	0.000***

Significant at: **$p < 0.01$; ***$p < 0.001$.

self-efficacy, and locus of control respectively. The results also showed that instrumental readiness (accessing capital, accessing information, institutional environment and social networks), have no significant impact on entrepreneurial intentions. Thus, *H4*: instrumental readiness has a positive impact on entrepreneurial intentions is not supported. These findings were consistent with the findings of Gerba (2012) who found that the mean score for instrumental readiness (access to capital, access to information and social networks) was much lower than the mean scores for other variables. The result shows that crisis had a significant impact on entrepreneurial intentions. It means the crisis does not motivate university students to entrepreneurial intentions. Thus, *H5*: the current crisis has a negative impact on entrepreneurial intentions is supported. However, this finding is different from the results obtained by Mouselli and Khalifa (2017).

DISCUSSION

This study provides empirical evidence for the state of entrepreneurial intention within a sample of final year students in two major universities in Yemen. This study came out with four important implications for the entrepreneurial intentions of university students. The result clearly indicates there is no significant difference between gender and entrepreneurial intention, which means, no meaningful difference between males and females in terms of intentions to start businesses, this is in line with the work of Smith et al. (2016). In contrast, some prior studies found that men had stronger entrepreneurial intentions than women (Zhang et al., 2014). The results also showed no significant differences in entrepreneurial intentions among students from public and private sector universities (Mouselli and Khalifa, 2017). In this study, prior entrepreneurial experience and age of the respondents significantly affect entrepreneurial intentions of students, these findings are consistent with that of Peng et al. (2012) and Ozaralli and Rivenburgh (2016), who found that the older students have higher entrepreneurial intention.

Additionally, the predictor strongly related to entrepreneurial intention in this study was the need for achievement, this finding is consistent with prior research

(Çolakoğlu and Gzükara, 2016; Yukongdi and Lopa, 2017). Among the personality factors, need for achievement seems to distinguish itself more than the others as a measure of intentions. It is one important personality trait that affects individuals' actions to entry into entrepreneurship (Fine et al., 2012). The high need for achievement pushes an individual to seek out entrepreneurial career in order to accomplish more achievement and satisfaction than could be obtained from other types of careers. Need for achievement should lead individuals to seek the challenges which match their personality and boost their confidence in the probability of their success, which might lead to an increase in overall society's growth. Nevertheless, the need for achievement alone is not enough to completely clear why one would choose to undertake an entrepreneurial activity, but, it does seem to be a key component. The results also show that self-efficacy and internal locus of control are important elements to entrepreneurship intention.

Furthermore, the study found that the access capability of entrepreneurial supporting factors, instrumental readiness (access to capital, access to business information, institutional environment and social networks), have no significant impact on entrepreneurial intentions. This result is inconsistent with the findings of Kristiansen and Indarti (2004) who found a positive relation between entrepreneurial intentions and instrumental readiness (accessing capital, information and networks). This difference may be due to the context of the current study. However, the findings of this research concurred with the results of the study conducted by Yukongdi and Lopa (2017) who did a study comprising respondents from 12 different nationalities in Asia, and they reported that the environment for starting a business had no significant on entrepreneurial intention. It also concurs with Susetyo and Lestari (2014) who found that instrumental readiness (access to capital, information and networks) did not impact significantly on entrepreneurial intentions of Indonesian university students. According to entrepreneurship literature, instrumental readiness supports development of entrepreneurial intentions and impacts nascent entrepreneurs in the form of access to capital, access to business information, institutional environment and quality of social networks. Nevertheless, the findings of this study considered instrumental readiness as one of

the major obstacles facing university students to consider entrepreneurship as a career choice. Another reason for the insignificant effect of instrumental readiness on entrepreneurial intention maybe as this study was conducted in an underdeveloped and unstable context where instrumental readiness is related to the issues such as unavailability of resources, insufficient capital and a general lack of infrastructural support. This result should be investigated with comparative studies in the future as well.

Moreso, one of the study goals concerns the impact of the current situation on entrepreneurial intentions. The results found the current situation, crisis effect, had a significant effect on students' entrepreneurial intentions, which means the crisis does not motivate university students to establish their entrepreneurial intentions and it harmed their entrepreneurial intentions. The results also show the crisis impact not only on the financial, psychological and social situation for students, but it also weakened dimensions of entrepreneurship, such as the intentions and perceived likelihood. Interestingly, this differs from the findings of Mousfor and Khalifa (2017) who noted that the crisis effect has insignificant impact on Syrian students' entrepreneurial intentions. However, the effect of the crises on entrepreneurial intentions are very diverse and depends on each case on a set of interacting factors, such as hampers overall economic activity, a decline in economic opportunities, type of crisis as well as the cause emerging from the entrepreneurship literature. There is a distinction between necessity- and opportunity-based entrepreneurship; this may explain the distinction between the two cases. Entrepreneurial literature's lack of research on the emergence of, and challenges to entrepreneurial activities during the periods of crises is a significant lacuna. This finding calls for further research on the impact of the situational factors on entrepreneurial intention.

Finally, the entrepreneurial intentions of university students can be considered as a stepwise process influenced by demographic variables, personality traits, environmental and situational factors. The study found that the personality traits were more effective than instrumental readiness which does not have a significant impact for the entrepreneurial intention, and need for achievement was the important personality factor. It has been revealed that the situational factor "crisis effect" does not motivate students' intentions toward entrepreneurship and it harms their entrepreneurial intentions. In addition to this, the current study concluded that the entrepreneurial intention of university students is complex and not easy to construct.

This study also has a number of recommendations. First, students should develop their entrepreneurial capacity by following informal and formal training and evolutions of different entrepreneurial skills needed to run a business. Also, the management of universities should make some changes in the curriculum and add entrepreneurship courses to influence and promote entrepreneurial intentions and skills among students. In addition, the government should make more efforts to enhance entrepreneurial skills by establishing business incubators and science parks that would provide students with excellent venues to develop their entrepreneurial intentions. Finally, although the studies attempt to separate the effect of situation factor, crisis effect, in forming entrepreneurial intentions from other factors, it may still be implied in other factors.

Limitations and future research directions

Like all studies, this research is not without limitations that should be addressed in future studies. It is clear that the results of this study are for a specific context. Although it is theoretically possible to extend this study to other contexts, the specific differences between the context of the study and other contexts over the world strengthen the generalization of the findings. Thus, a useful extension would be to conduct this study in other environments that suffer from crises and economic and political instability. In communities suffering from war and crises, entrepreneurship may be affected differently by attributes and contexts. Therefore, it is necessary to overcome the constraints of measuring this factor and to find more accurate measurements. The authors hope that this study could provide an important first step to further examine the antecedents of entrepreneurial intentions in hard and unstable contexts which could promote future studies in this important area. In addition, the investigation of the effect of entrepreneurship education on shaping entrepreneurial intentions of university students is also a gap and an interesting topic that deserves further research in the study context.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Using big data in telecommunication companies: A case study

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The study was aimed at examining big data management in three telecommunication companies. The case of Big Data management was studied using a qualitative research approach with the primary method of open-ended interview. Websites and documents were examined for developing company profile. Observations augmented data collection from other sources. Companies have widespread operations with substantial stakes. Big Data was managed by using diverse systems such as Cloudera Data Hub (CDH) and SaaS. For data security, these companies made different arrangements. Three companies used big data systems for diverse functions and applications. These companies needed to develop competent professionals for data management, security, and other applications. It was a study of its own kind conducted in this context. Companies in different sectors may benefit from these findings and suggestions. This study may have wider implications for regional organizations. These are credible findings for these companies in managing big data. Other companies may also benefit from these findings.

Key words: Big data, telecommunication companies, data security, big data management.

INTRODUCTION

Telecommunication companies need to deal with Big Data. Big Data is a combination of structured and unstructured data that need advanced statistical and instructional methods. "Big Data combines information from diverse sources to create knowledge, make better predictions and tailor services" (Martin, 2015: 11).

Big Data must be secured by setting policies and regulations. There is a relationship between Big Data and privacy and security issues including collection, storing, sharing and accessibility (Kshetri, 2014). The challenge of preventing advanced threats must be solved using Big Data analysis. Both data security and data privacy are needed for telecommunication companies and

organizations. Telecommunication companies are struggling with privacy issues because of the increase in security and privacy issues (Inukollu et al., 2014). Big Data security saves organizational data from being misused and stolen by hackers or competitors. Most companies use security policies to protect their Big Data analyses.

In terms of Big Data in telecommunication companies, Khan et al. (2018) showed that in Big Data Telecom Sector, about 40% of the world population, has an internet connection. The number of Internet users has increased tremendously from 0.4 billion in 2000 to 3.4 billion in 2016. Mary Meeker's annual internet trend

report in 2016 showed that China has the biggest internet population, followed by India and the USA. Big Data in telecommunication companies require data governance which is considered of special importance.

The primary aim of this study is to examine how telecommunication companies manage Big Data since it includes personal and sensitive information for clients. Various ways and measures are used to ensure Big Data is managed and secured inside and outside telecommunication companies in Kuwait. It would cover access, control, data codes, and data segregation (Chen et al., 2014). In addition to policies and safeguards, the security rules also contain several standards and implementation specifications that address organizational requirements. It is required to protect electronic systems' equipment and data from threats, environmental hazards and unauthorized intrusion. They include restricting access to organizations' servers, computers, and information and retaining off-site computer backups.

Problem statement

There is a need to examine the use of Big Data in telecommunication companies in Kuwait. Also, it is needed to study how telecommunication companies deal with Big Data and implement it in addition to security and privacy issues. It is needed to know how policies and regulations help in protecting Big Data in telecommunication companies. Besides, there is a need to investigate how Big Data is used for providing the required information in the telecommunication sector to overcome the challenges faced in implementing Big Data. This study may increase awareness among stakeholders and may build positive perceptions toward using Big Data in the telecommunication sector. Besides, the study may clarify the privacy and security issues of using Big Data.

Research questions

According to the objective of the research, we have formulated the following research questions:

(i) What were policies, processes, and regulations Kuwaiti telecommunication companies use to implement and manage Big Data?
(ii) What were the challenges Kuwait telecommunication companies face in implementing Big Data?
(iii) What were the skills the staff need to have to manage and implement Big Data?
(iv) What were the strategies and processes Kuwaiti telecommunication companies need to deal with Big Data issues of security and privacy?

Literature review

Here we examined how other studies viewed the issues being addressed in this study. It explains divergent viewpoints on related issues of managing Big Data in organizations. Relevant concepts and applications, reviewed in various studies, are covered subsequently.

Big Data: Conceptual framework

There are many aspects of Big Data. Géczy (2014) posits that complex systems can generate a huge amount of serviceable data. The data reflects various operational aspects such as the functionality of systems, interactivity of humans with environments and digital devices. Data also reflect internal and external stimuli from sensors. Crawford and Schultz (2014) assert that the big reliance on existing data and analysis created detailed individual profiles. Big Data exploded the scope of personally identifiable information ("PII"), which is effectively marginalized schema by avoiding current privacy protections. Furthermore, poor execution of Big Data may create additional harm by inaccurate profiles that impact an individual's life. One of the Big Data features is the "Bought" feature. It prompts users to buy additional items that are selected by a collaborative filtering tool (Tene and Polonetsky, 2011).

Big Data needs many requirements for infrastructure. Martin (2015) contends that "Big Data combines information from diverse sources in new ways to create knowledge make better predictions or tailor services" (p. 72). Big Data requires special technology such as computers and servers where data can be stored and analyzed. Big Data has a great impact on the future of the organization's development. Furthermore, governments serve their citizens better, hospitals are safer, and firms become more systematic.

Implementation of Big Data

According to Martin (2015), Big Data is a combination of huge and complex data with advanced analytics to improve security and marketing and reduces risks. The implementation of Big Data is valuable and useful in the business sector. Frizzo-Barker et al. (2016) noted that there are several key insights into the investigation of Big Data. In terms of the theoretical foundation, Big Data remains the early-stage domain of research. The rise of Big Data starts up as a socio-technical phenomenon. Large-scale search data help business organizations to create better tools, services, and products (Boyd and Crawford, 2012). On the other hand, Géczy (2014) states that the technological explosion produced data presenting various challenges and opportunities. Big Data provides opportunities to explore new scientific domains. However, Big Data also highlights challenges ranging from acquisition and technological issues through processing and maintenance to business and social consequences.

Phases in implementation of Big Data

Big Data has many implementation phases to achieve the desired goals for a business organization. Chen et al. (2014) focused on the four phases of the value chain of Big Data: data generation, data acquisition, data storage, and data analysis. Data generation means generating data to get something new. This phrase shows up the creativity and innovation of Big Data. Data acquisition refers to collecting data from articles, databases or other sources. Data storage refers to saving and storing it in storage for retrieving data whenever it is needed (Gamage, 2016). For each phase, there are several steps since it is a systematic way to deal with data. Each phase has a background, technical challenges, advantages, and disadvantages. Finally, it is important to examine several representative applications of Big Data, including enterprise management, Internet of Things, online social networks, medial applications, collective intelligence, and smart grid.

The features of Big Data made all sectors active in implementing Big Data. Géczy (2014) noted that the quantity of generated and stored data and the size of the data determine the value of Big Data implementation. Velocity is the speed at which the data are generated and processed to meet the demands and challenges that lie in the path of growth and development. Variability helps to handle and manage data. Veracity is the quality of captured data that also affects the analysis of Big Data. This helps people to analyze data effectively. Kshetri (2014) viewed benefits associated with implementing Big Data might be privacy, security and consumer welfare. So Big Data is not easy to be used in the business sector.

Ouyang et al. (2018) pointed out measures of network structure, determined by the network itself. The network is affected by an individual's social interactions and individual characteristics. Data quality depends on Customer Relationship Management (CRM) in a telecommunications company. The strategy of data management requires the implementation of a CRM system to avoid poor customer data quality. Also, integrating data quality and data architecture management is based on findings from the tele-communications industry. A clear example of developing data currency metrics was reported at German mobile phone providers where they provided a means of economic impact estimation of measures to improve data currency (Otto, 2011). Telecommunication companies are marked by high IT spending, Big Data volumes, legal and regulatory requirements related to security and privacy of customer data. Further, it depends on intensive consumer interaction and complex application systems.

Implementing Big Data in different sectors

Joseph and Johnson (2013) noted that government agencies, such as the US Department of Veterans can extract and analyze Big Data to more efficient and effective delivery services. Using Big Data in the public sector helps to achieve desired goals and exploit knowledge effectively. Desouza and Jacob (2014) noted that the role of Big Data in the public sector shows the limits of Big Data in the public sector need huge space and storage. Big Data needs regular updates due to continuous changes in the business and economic sector. For that reason, most organizations conduct workshops and training courses about using Big Data effectively in the public sector. Organizations implement Big Data to achieve business goals and objectives.

Challenges in Big Data implementation

Big Data, also known as "data analytics," is criticized as a breach of privacy and distorting the power relationship. Hence, most organizations generate large and complex data using new predictions and generalizations. Firms making use of Big Data have targeted individuals for products based on their computer type (Martin, 2015).

Big Data helps in achieving the best results and best understanding. Big Data helps an organization to overcome weaknesses and keep strengths. Mithas et al. (2013) noted that most enterprises do not know how to use this "Big Data" in order to make decisions or solve problems related to business advantage. Big Data helps enterprises to deal with complex decisions and problems by creating a virtuous cycle for better approaches, techniques, tools and provides new insights for business analytics (Maheswaran and Asirvatham, 2018).

Data analytics helps the business to understand online communities and political movements to make better decisions (Boyd and Crawford, 2012). Analytics of Big Data can be used in the offline environment to study customers' in-store behavior to improve the layout of the product (Tene and Polonetsky, 2011).

Khan et al. (2018) made a forecast that in the year 2050, about 95% of the world population will be connected via the internet using wireless mode to connect as GSM that generates a huge amount of data for the telecom industry. Unfortunately, telecommunication companies are not ready to deal with these issues. Data mining tools and techniques are required to dig out the required data and avoid redundant data.

Joseph and Johnson (2013) claimed that descriptive analytics produce standard reports and alerts. Predictive analytics is concerned with forecasting and statistical modeling. Prescriptive analytics focuses on optimization and randomized testing. For that reason, organizations must know how to apply statistical results to improve organizational functions and achieve organizational goals.

The first challenge is the huge cost of Big Data requirements as technology, trained staff, and specialists. The second challenge is the difficulty of analyzing data

since it needs special methods. Also, storing Big Data in huge spaces is a big challenge for most companies (Joseph and Johnson, 2013). The other challenge is the organization`s view toward using Big Data since some of them refuse using Big Data. However, there are some challenges related to the governments in adopting Big Data applications. In order to realize the benefits of Big Data, policy-makers need to conduct research, plan, design, and create incentives to encourage employees using it for both private and public sector entities to share, generate, implement, codify data, and set up programmers to develop appropriate skills (Saxena and Sharma, 2016). The challenges of implementing Big Data improve the understanding of the state of Big Data in decision-making for the business sector (Frizzo-Barker et al., 2016).

Big Data must be secured by setting policies and regulations. The relationship between Big Data and privacy and security issues must be examined from the standpoints of data collection, storing, sharing, and accessibility (Kshetri, 2014). Also, privacy, security, and welfare vary across consumers of different levels of sophistication and vulnerability.

Security considerations

Most companies use security policies to measure their Big Data analyses. Big Data security saves organizational data from being misused and stolen by hackers or competitors and measures are used to ensure security for Big Data inside and outside the organization as access control, data codes, and data segregation (Chen et al., 2014).

In addition to the policies and safeguards, the security also contains several standards and implementation specifications that address organizational requirements. It is required to protect electronic systems, equipment, and data they hold from threats, environmental hazards and unauthorized intrusion. They include restricting access to organizations' servers, computers, and information and retaining off-site computer backups. Various ways and measures are used to ensure security inside and outside the organization (Chen et al., 2014).

Big Data has many predictive privacy harms. "Personal harms emerge from the inappropriate inclusion and predictive analysis of an individual's data without their knowledge or express consent" (Crawford and Schultz, 2014: 94).

Big Data has serious privacy problems. The content of Big Data is gathered from online user interactions and infrastructure sensors, online transactions, search queries, health records, communication networks, and mobile phones. Various types of data collection are used in contexts of direct marketing, behavioral advertising, third-party data brokering, or location-based services.

These data types should be solicited and granted. The focus should direct to express consent and data minimization with little appreciation for the value of data uses (Tene and Polonetsky, 2011).

Thus, Big Data is an effective tool that telecommunication companies can use beneficially. The implementation of Big Data has various ethical issues. The ethical issues include the security and privacy of Big Data. The afore-cited studies have pointed to the need that, each public Company and organization should resolve ethical issues of security and privacy in the process of implementation and eventual evaluation of Big Data.

METHODOLOGY

This study uses an exploratory and explanatory research design to "better understand the problem on hand and reduce the latter's degree of ambiguity" (Hejase and Hejase, 2013: 113). In addition, a qualitative research approach is implemented whereby the data collection used in this case study had a combination of reviewing website content, the conduct of interviews, and observation of sites of these companies. For the sake of anonymity, we have used labels of Company A, Company B, and Company C in this study. The interview contained a list of open-ended questions.

Sampling

A non-probabilistic sampling is used whereby participants of this study were chosen conveniently based on their willingness to participate. Participants were the managers in three companies working in the telecommunication sector in Kuwait. From each company, three participants were selected to be included in the study for a face-to-face interview. The participants were nine officials having different positions as managers, team leaders, and other responsible officers for Big Data in these companies.

Review of websites

This review provided a basic profile of the three telecommunication companies of Kuwait, their background, operations, services, and contact details for officers.

Conduct of interview

An interview was used to collect data. It included different types of questions. The first section included demographic questions seeking information about the participants and general information. The second section included open-ended questions about facts, perceptions, and opinions about using Big Data in three telecommunication companies. The focus of the interviews was around the following points:

(i) The system used to manage Big Data
(ii) Management and organization of Big Data in Company
(iii) Challenges faced in Big Data management
(iv) Staffing situation, potential, and prospect for managing Big Data
(v) Handling and managing security of Big Data
(vi) Policies and regulations used for protecting Big Data
(vii) Skills needed for Big Data management and applications, particularly about privacy and security
(viii) Challenges in managing Big Data
(ix) Strategies used to deal with emergency issues in dealing with

Big Data

Use of observation

The interviewees were keenly observed for their extra-verbal cues and expressions. Also, available documents were used to ascertain profiles of the participant companies, their stakes, clientele, and market penetration. This provided valuable input that was useful in drawing suggestions for this research.

Data collection

Interviews were conducted with participants from three telecommunication companies A, B, and C. Interviews were conducted during working hours in the morning and it took averagely 25-30 min. Data collected through interviews were qualitatively analyzed.

Findings

The participants in this study were both male and female. It was found that 4 participants were male and 5 were female. As per the positions of participants, they were 4 managers, 3 directors, 1 operation manager, and 1 manager of billing operation (Table 1).

Company profile

Table 1 shows the number of employees, categories of staff, founding date, market capitalization (in millions of Kuwaiti dinars), authorized share capital, and principal activities. In terms of the number of employees, Company A had 530 employees, Company B had 487 employees, and Company C had 420 employees. It is a close range, as numbers fell between 420 to 530.

Concerning categories of employees, Company A provided cloud data services, mobile, software, telecommunications, Company B had the business of mobile and telecommunications, while Company C dealt with infrastructure, mobile, and telecommunications. In terms of market capitalization, Company A marked 1,968 million, Company B recorded 365 million, and Company C had 365 million. Company A was founded in 1983, Company B in 2008, and Company C in 1987. The authorized share of Company A is 432 million Kuwaiti Dinar, while Company B had 50 million Kuwaiti Dinar, and Company C also had 50 million Kuwaiti Dinar. In terms of principal activities, Company A dealt with purchase, delivery, installation, management, and maintenance of mobile telephones, paging systems, and investing in financial portfolios managed by specialized companies and institutions. Company B had principal activities of purchase, supply, installation, operating and maintaining wireless telecommunications devices and equipment (mobile telecommunication, calling system, and other wireless services). Company C dealt with the supply and provision of mobile telephone and paging systems and related services in Kuwait. Portfolio managers invested surplus funds in shares and other securities.

Table 2 shows that the three telecommunication companies are using different analysis and operations in using Big Data. Company A used technical and business (Revenue generation and customer experience) for data analysis. The number of employees using Big Data was about 25. Company A used Big Data for data mining and report analysis. Company B used it for customer analytics and behavioral analytics. The number of employees using Big Data was 25+. This Company did not specify any operations for using Big Data. Company C used database offloading and log analysis for Big Data analysis.

Only 2 employees used Big Data in Company C. In terms of operations of using Big Data, Company C used database analysis. All the participants responded to the interview questions. Their statements were in text form, which has been analyzed subsequently.

Systems used for Big Data and management

The participant from Company C responded that they used Cloudera Data Hub (CDH) and the participant from Company B said that they used SaaS. Company A also used Cloudera. Two companies A and C used the same system. The participant from Company A responded that they had outsourced to Cloudera Enterprise to manage their Big Data. Company B used an enterprise's data warehouse which works as the base to supply data to the SaaS platform. The participant from Company C responded that it was business as usual and they found it part of any typical system.

Challenges in implementation

In Company A, challenges were reported to be knowledge-related and their applications of five Vs, which are volume, velocity, variety, veracity, and value. In Company B, the major challenge noted was how to pool data into a single source of database. It is also recommended to maintain a single source for data such as EDW/BI solutions. The participant from Company C found that their challenges included lack of experience of staff, need to learn new technologies, and managing performance.

Security management

The participant from Company A said that security issues can be resolved by using different authentication channels and integrating with sources like Kerberos and directories. It was found that in Company B, privacy issues and access to data were strategically compartmentalized, based on the level of authorization. Further, a data analysis solution was used as a premise-based solution, making data inaccessible to general consumers. The participant from Company C responded that by using commercial Big Data product of Cloudera or Norton works, they have added many security features to open source.

The participant from Company A stated that they used different policy regulations for Big Data specifically for their organization. National regulation policies were applied to avoid a data breach. The participant from Company B stated that they did not see any specific regulation for data protection in the Middle East. There are general GDPR regulations that organizations need to comply with. Data classification levels are implemented to restrict sensitive information for customers because data in the telecommunication sector is internal and confidential. Company C respondent viewed that internal security policy has been updated to match new Big Data technology. For managing security, the participants were asked about the skills staff should possess. In Company A the participant stated that their staff needed knowledge of Linux Administration, System Administration Knowledge, and Cluster Administration. In Company B staff was expected to be proficient users of CISA and having sound experience of information security practices. The participant from Company C noted that OS skills were useful strategies for staff.

Challenges in Big Data management

The participant from Company A observed that dealing with new

Table 1. Company profile.

Information	Company A	Company B	Company C
Number of Employees	530	487	420
Categories	Cloud Data Services, Mobile, Software, Telecommunications	mobile telecommunications service	Infrastructure, Mobile, Telecommunications
Founded Date	1983	December 2008	1987
Market Capitalization (Million)	1,968.812	365.488	365.424
Authorized share capital	432,705,890.900 Kuwaiti Dinar	50,000,000.000 Kuwaiti Dina	50,403,276.000 Kuwaiti Dinar
Principal activities	The purchase, delivery, installation, management, and maintenance of mobile telephone and paging systems. Investing in financial portfolios managed by specialized companies	Purchase, Supply, install, operate and maintain wireless telecommunications devices and equipment (mobile telecommunication, calling system, and other wireless services).	Supply and provision of mobile telephone and paging systems and related services in Kuwait. Investing surplus funds in shares and other securities managed by portfolio managers.

N=9.

Table 2. Big Data Analysis and Operations.

Companies	Company A	Company B	Company C
Areas of using Big Data	Technical (cost saving) and business (revenue generation and customer experience)	Customer analytics and behavioral analytics	Database offloading and log analysis
Number of employees using Big Data	Appx. 25	25+	Only 2
Operations done by using Big Data	Reporting analysis Data mining	NO	Database analysis

N=9.

systems was problematic if the users did not have the right skills and knowledge. Besides, Big Data is a major asset with its large volume and a wide variety of components. This becomes a challenge that these data are appropriately used. The participant from Company B stated that dealing with Big Data was not problematic if the expectations were crafted. The participant form Company C maintained that Big Data was not problematic, but hard work and knowledgeable staff provided solutions.

Managing emergencies

The participant from Company A noted that prompt availability and disaster recovery were the keys to alleviate issues of data loss. The participant from Company B responded that the strategies for dealing with emergency issues followed Company's management strategies, as they have contingency plans for emergency issues. According to the participant from Company C, they followed the same incident management process, which was used in other practices in the organization.

DISCUSSION

Big Data are a critical resource telecommunication companies have to deal with. It has privacy and security issues, which cost these companies significantly. Big Data requires intellectual assets and skills and capable professionals can manage it. Telecommunication companies use different systems to deal with Big Data in Kuwait, depending on their needs and goals. Big Data's application may provide an edge to telecommunication companies against their competitors.

Telecommunication companies need more awareness about the volume of data requiring deeper analysis of customer behavior, interests, and service usage patterns. Big Data have definite values for telecommunication companies in adding value-added services. The increasing adoption of smartphones is causing major innovative initiatives for the expanding market of mobile applications using the internet. Telecommunication companies have access to huge amounts of data sources, for example, customer profiles, location data, apps downloaded, device data, network data, customer usage patterns, etc. These are major opportunities for these companies despite their challenging overtones. Many requirements are required for Big Data infrastructure. Big Data benefits from a combination of information from different sources to create knowledge, make better solutions, and offer valuable services.

Telecommunication companies are expected to serve their consumers better if the information is well treated for the privacy of personal information and the security of transactions. These ideals can be achieved as these companies' Big Data is managed systematically. The

security concerns have widely been discussed in many studies (Chen et al., 2014; Crawford and Schultz, 2014; Tene and Polonetsky, 2011). This way Big Data should have a major impact on the development of the telecom industry, Big Data management requires special skills and techniques such as computers and IT skills and problem-solving skills.

Saxena and Sharma (2016) were concerned about human resource aspect of the big data management. We have noted the difficulties of dealing with Big Data can be overcome by promoting employees' competencies about Big Data use, implementation, and critical aspects of privacy and security. Big Data need to be protected from misuse and damage by hackers and security breaches. These companies need to enforce strict measures for ensuring the protection of security and privacy of Big Data.

Big Data may create serious concerns for millions of subscribers of these three companies if appropriate strategies and policies are not developed. These companies need to manage this vital resource with the utmost care, foresight, and vision. Millions of records are transacted regularly in these companies and the amount of traffic needs to be monitored with keen attention. Telecommunication companies use Big Data to bring value to the telecom industry in the country. These companies need to resolve the issues of customer retention, network optimization security, and preparation of stakeholders in a different section of these companies by delivering better opportunities. Telecommunication companies should manage Big Data by paying adequate attention to customer perspectives. This concern was also shared by Joseph and Johnson, (2013).

Telecommunication companies need to be able to prioritize their fund flow and control so that Big Data operations are continually managed without technical breakdowns, system failure, and remittent shutdowns. Big Data have additional pressures on these companies for the provision of space and other infrastructural commitments.

Khan et al. (2018) had forecasted that in the year 2050, about 95% of the world population will be connected via the internet using wireless mode to connect as GSM that generates a huge amount of data for the telecom industry. It has become obvious that Big Data management is exposed to changes in systems, files, and transactions. These companies need to update their systems and facilities continually and systematically. Concerned staff members need to be trained for the changes by conducting workshops, training courses, and using other staff empowerment initiatives.

This study was conducted in a member nation of a 6-nation consortium of Gulf Cooperation Council (GCC). Other nations are Saudi Arabia, United Arab Emirates, Qatar, Oman, and Bahrain. This is a natural entity having a cultural, linguistic, religious, social-politico-economic affinity. This study has its natural ramifications for

companies in these countries. While these findings cannot be generalized as no sampling was possible that would cover these countries, yet these findings may provide general guidelines for business organizations in the region. This study is limited in scope and conduct. Other sectors may be covered in additional studies. A survey may be practical with random sampling at national or regional levels. More intensive treatment is desirable if the companies are not too shy and constrained in providing data. Other business sectors may not be as secretive in allowing interviews and physical visits as was experienced in this study.

Conclusions

This study has meaningful implications for Kuwaiti companies as well as other enterprises in the six-member nations of the Gulf Cooperation Council (GCC). A striking derivation is the desired diversity in the use of systems and applications. This diversity affords flexibility to enterprises, having distinct identities in terms of size, asset value, clientele, and managerial peculiarities. Big Data is managed in view of the specificities of each enterprise. The findings of this study are reassuring for business organizations in the ingenious adoption of appropriate systems and utilities.

Data security is one of the vital concerns for business organizations. A constant increase is evident in investing enormous resources in making consumer data secure. The service sector organizations are seriously mindful of their obligations that their data is secure from any threat that breaches individual rights of protection of personal and financial transactions. Innovative developments for enforcing encrypted systems, firewalls, anti-virus systems, and security guarantees bring fresh opportunities in the face of an increase in data breach incidents. It is a tug of war and the organizations must make big data secure for all the stakeholders.

The three companies expressed the need for developing competence among those professionals who have the responsibility to manage big data. Big data management requires the expertise of system analysis, design, database management, teamwork, networking, and launching portal. These professionals have to collect data from different sections and deal with different managers of the company. These competencies are varied and require befitting training of these professionals. They need to have the opportunity for continuing development, using on-the-job training and reaping other benefits of self-development. External opportunities for attending short courses, workshops, etc. may also provide additional avenues for skill enhancement of this workforce.

One company outsourced big data management to an outside company. If other risks of data abuse are neutralized, it may be a viable option and the need for

engaging a large number of experts may be minimized. Outsourcing requires rigorous negotiations and licensing. Top management of a company may have to strategize this option with foresight and consideration for the long-term benefits. One thing cannot be overemphasized about enterprise management. Companies sustain, survive and prosper if these use a strong profile of innovation and constant rejuvenation. Big Data management needs constant updates in system design, fresh applications, and new applications. It is a challenge how these companies have new initiatives for the emerging market of social media, smartphones, and innovative approaches for sharing and networking.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Enterprise zones in Sub-Saharan Africa: Evolution, rationalization, processes evaluation and outcomes

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The history and development of Enterprise Zones, as both a deliberate government policy of integrating the economies of Sub-Saharan African into the global stream and as a trade policy instrument of re-adjustments and limited resource acquisition option, have different and varied intendments for the countries that implemented them. However, what seems evident from their current, and rather rapid proliferation, is that they soon became a preferred policy option, with significantly little evidence of improvements or changes in sub-regional market developments, employment, GDP or FDI. The objective of this paper is an attempt to answer some questions occasioned by the apparent failure of these initiatives: the reasons for the proliferate establishment; reasons or factors that explain the seeming disparate applications and outcome. This will be achieved through an evaluation of selected countries' data and determining the success factors and failures of the Enterprise Zones' experiment. The evaluation of data and case review indicate an inconclusive, mixed bag of outcomes that could be explained by disparate sub-regional processes' application, national infrastructural disparities and policies' inconsistencies. Finally, it is hoped that this exercise offers fresh insights into the dynamics of implementation, as well as identify a policy or implementation lapses, make recommendations, and possible new areas of research.

Key words: Enterprise zone development, processes evaluation, outcomes, markets development, Sub-Saharan Africa.

INTRODUCTION

Much of the countries in Sub-Saharan Africa (SSA) are primary producers, in the sense that they are exporters of minerals, oil, gas and raw or semi-processed agricultural products, with little or no value-added. The urgent, if inevitable, need for processes improvements. Value addition to some of these first products before exportation called for diversification and alternative processes/products' enhancements, and a need to create a unique economic environment that enhanced or facilitated the processes, without the strictures and bottlenecks of the traditional market environment of these countries. It was also believed that a business environment so distinctly

and purposefully structured would be more attractive to foreign direct investment (FDI), especially in the context of the then freshly articulated Chinese government's policy of "going global" (*zouchuqu*). For some of the countries in the sub-region, there was also the need to re-evaluate the outcomes and sustainability of the Structural Adjustments Programs (SAP) that had not produced the desired outcomes as canvassed by the Bretton Woods Institutions (BWIs), in justifying their original implementation (Madani, 1999; Nwankwo and Richards, 2001). It is in the light of these failures, and perhaps the quest for viable options, that the Economic Zones (EZs), for the majority of these countries, was considered a second-best, exploratory alternative, as opposed to the hitherto generalized country-wide reform initiatives of the BWIs' auspices, which had had unsatisfactory outcomes (Farole and Akinci, 2011; Neveling, 2017; Watson, 2001).

It is instructive that different countries have given their initiatives different names, even though substantially, their original basis was identical and they serve the same primary market and economic development purposes or reasonably expected outcomes. And the prevalence and rapidity of establishment was rather peculiar that one cannot but wonder whether the rapid proliferation was a function of its effectiveness, fad or evolving experimentations. According to Farole (2011), "the term *economic zones* encompasses a wide variety of related concepts, including free trade zones, free ports, foreign trade zones, export processing zones, special economic zones, free export zones, trade and economic cooperation zones, economic processing zones, and free zones" (p. 23). The United Nations Industrial Development Organization (UNIDO) defines EZs, "as a relatively small, geographically separated area within a country, to attract export-oriented industries, by offering them especially favourable investment and trade conditions relative to the remainder of the host economy". In particular, the EZs provide for the importation of goods to be used in the production of exports on a bonded duty-free basis (UNIDO, 1980). Perhaps borrowing from China's distinctive initiative, Industrial Parks have become part of the collective of Special Economic Zones (SEZs) in SSA. Interestingly, the difference in terms, surrounding Industrial Parks and the other zones' description is not so much in meaning but emphasis (Bost, 2010; Côté and Cohen-Rosenthal, 1998; Dodescu and Chirilă, 2012; FIAS, 2008; UNCTC-ILO, 1988).

It has also been suggested that "Industrial Parks" has a more significant antidotal meaning or implication for SSA. It has been argued that the Apartheid State established "industrial parks" in the black enclaves known as Bantustans, to exploit cheap surplus labor, satisfy demands for jobs, and to act as buffer zones against increasing waves of black urbanization (Bezuidenhout and Moussouris, 2007), an apparent different national

rationalization from the orthodoxy. Firms that invested in these "border industries" were granted government subsidy packages and other concessions. Jauch (2002) describes them as Export Processing Zones (EPZs) in disguise and claims they formed the precedent for modern-day Industrial Development Zones (IDZs).

The overarching consideration and rationale for the establishment of EZs, substantially mimicking the SAP institutional rationale, was thus to achieve several objectives: attract FDI, create viable manufacturing and exporting capacity, generate foreign research skills and technology transfer capabilities, serve as employment generator alternative, as a complementary instrument in support of a broader economic reform strategy, as well as a structural laboratory for the implementation of new and alternative policy options and approaches (Farole and Akinci, 2011; FIAS, 2008). These remain the fundamental preoccupations, rationale and impetus for current initiatives in the sub-region, all in attempts at national economic development and rejuvenation. These are also some of the kinds of linkages articulated by Stein (2012). Unfortunately, analysts believe that, with very few exceptions, the *Zone Project* and the original rationalization and justifications have been less than successful. Indeed, Madani (1999) believes that "EPZs did not fulfill the role of engines of industrialization and growth" (p. 7), as some proponents had projected. However, the author is also of the opinion that "under propitious circumstances and good management, export processing zones generally achieved the two basic goals of creating employment and increasing foreign exchange earnings" (p. 5). This is debatable, and the inclination here, for the authors would be to argue, strongly, to the contrary, that SSA wears a different and disappointing experience in terms of outcome, with the possible exception of Madagascar. There are myriads of reasons for this, including the fundamental competitive challenge or disadvantage that SSA has become, in every conceivable complementary infrastructure support system.

Besides, available evidence suggests that Africa has a fundamental challenge associated with competitiveness, especially concerning manufacturing, due to issues of geography, scale, and transaction costs, particularly since China and India have integrated into global markets. The success inhibitors are considerable when it comes to supporting infrastructure, regulatory oversight, policy consistency and coordination. In the management of EZs, SSA can be described as an intractable national and sub-regional enigma, defying all known orthodoxies. Much of the African countries "face a much more difficult competitive environment, resulting from factors such as the emergence and entrenchment of "factory Asia"; the expiration of the Multi-Fibre Arrangement; the consolidation of global production networks; and recently slowing demands in traditional export markets" (Farole

2011: 6). It is ironic, and perhaps instructive that some of the success factors that gave impetus to the establishment of the Zones, for the most part, may have been responsible for its relative lack of success in the region, albeit predictably. The rationale for the establishment was argued to have been to take advantage of open access in the global economy, with some rapidly evolving dynamics of processes improvements, economies of scale and scope, high technological improvements and advancements, shortened products and services life cycle (Bartlett and Beamish, 2018; Mengistu, 2014). The countries in the sub-region were either ill-equipped or lacked the requisite capacities for meaningful participation, in what became an increasingly competitive and constantly evolving global marketplace. An argument can also be based, given the weak hands of these economies and "imposed" trade liberalism of the era, on the neo-classical theory of enterprise zones being second-best policy choice, which consisted of compensating for one distortion (import duty) by introducing another (subsidy), which most analysts have argued was the policy essence of the Zones' initiatives.

Unfortunately, in much of the sub-region, the support infrastructure, essential for successful implementation of the initiative, is obsolete, dilapidated and out of alignment with the broader national economy. This raises several questions, including whether the EZs had been contemplated as an independent, stand-alone operation, devoid of any integrative connections with the national economy. For African zones to be competitive, some of the barriers to the competitiveness of local value chains such as inadequate integration with domestic economy must be eliminated (Curran et al., 2009; Farole, 2011; Namada et al., 2017; Watson, 2001). Besides, there is also the question of the sub-regions capacity for integration into the global market, given important inhibiting variables, like unavailability of factors (of production), comparative and competitive disadvantage, and lack of market proximity. These seem to put other countries/regions in superior competitive positions, which in and of itself, would also affect FDI. Evidence in this area is too thin to reach any conclusions, and the question of whether some of these FDIs would have occurred in the economy without EZ incentives is mostly unanswered, but putative. What can be deduced from the overall assessment of the rationale or impetus for the Zones' establishment is one of very tentative, speculative suppositions at best, and at worse, unrealized collective sub-regional objectives.

Markets proximity and comparative advantage

Following these considerations, the authors have determined two fundamental phenomena affecting EZs in

SSA. One is, "Market Proximity" and the other is "Comparative Advantage". "Market Proximity", relates to the relative distance between the location of production completion or substantial value addition, to the location of distribution and final consumption. Besides, how large and viable the market is, measured by Purchasing Power Parity, determines the viability and relative competitiveness of the zones' location. These lead inevitably, to "Comparative Advantage" consideration. In an extremely competitive global environment, that encapsulates "Factory Asia", Eclectic Paradigm, and Location Advantage (Dunning, 2000; Farole, 2011; Rugman and Verbeke, 2009), do these countries/regions and their designated EZ locations provide the essential comparative advantage, concerning countries outside SSA? The presence of a vast internal market and a comparative labor cost advantage are essential to the success of African SEZs. The more local investors invest in African SEZs, the higher the productivity of these zones, especially as it relates to FDI (Curran et al., 2009; Farole, 2011; Watson, 2001).

According to Porter (1990), competitive advantages of Zones may be explained in terms of the cluster approach, in that Free Zones are industrial clusters of companies that are located in a geographic region. These clusters of companies share economic infrastructure, a pool of skilled human capital. They also have shared access to governmental and other institutions that provide education, specialized training, information and technical support. These companies may also work together to create joint companies, distribution agreements and common manufacturing agreements. It has been argued that that external economy of scale and other advantages of cluster help the operating firms in reducing costs, acquiring competitive edge and attracting FDI (Dunning, 1998). This raises the question of whether these locations in SSA and their complementary attributes have inherent compositions or inadequacies that put them at substantial advantage or disadvantage? This is significant, having consideration to the underlying rationale for the Zones' establishment in much of the sub-region, namely, the segregation of distinct geographic locations purely for the production of high quality, export-driven, high-value products/services that meet and compete in the global market place, without the regulatory and bureaucratic structures obtainable in the larger national economies in these Zones (Aggarwal, 2012).

Many countries in the sub-region have indulged some form of the Zones' initiatives (Table 1). The benefits of SEZs are generally viewed in terms of "static" and "dynamic" effects. Static effects are direct gains such as foreign exchange earnings, export growth and employment creation. In contrast, dynamic effects are indirect gains such as technology transfer and innovation, skills upgrading, export diversification and enhancement

Table 1. Africa's zone programs by decade.

The 1970s	Liberia, Senegal, mauritius
The 1980s	Djibouti, Togo
The 1990s	Burundi, Cameroon, Cape Verde, Equatorial Guinea, Ghana, Kenya, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Rwanda, Seychelles, Sudan, Uganda, Zimbabwe
The 2000s	Gabon, Gambia, Mali, South Africa, Botswana, Zambia, Eritrea, Mauritania, DRCCongo, Tanzania, Ethiopia

Adapted from "Economic Zones in Africa: Comparing Performance and Learning from Global Experiences" by Farole (2011), Copyright 2011 by The International Bank for Reconstruction and Development/The World Bank.

of productivity and trade efficiency of local firms (Gibbons et al., 2008; Zeng, 2010). These benefits, as evidenced by the success of SEZs in China and other Asian countries, provide some explanation as to the popularity of SEZs as tools for economic development and rejuvenation (Economist, 2015). On the contrary, the reality is that more SEZs have performed below expectations. The question is whether these levels of proliferation are a function of the Zones' effectiveness, copy-cat fad, evolving experimentation or replication of successful models.

METHODOLOGY

The purpose of this paper is an attempt to answer some questions on the establishment and implementation of the Economic Zones initiatives, namely, the rationale for establishment; the possible underlying reasons for proliferation; reasons or factors that explain the seeming disparate applications and measurable outcomes.

In order to answer some of the questions raised, the authors identified five countries, as reference countries for this evaluation, based on attributive commonalities and similar structural assumptions amongst them, including the rapidity of proliferation. These are Ethiopia, Ghana, Kenya, Nigeria and South Africa. In countries where EZs have been established, there seems to be levels of rapid proliferation within a short period. The authors reviewed available data and reports on these countries. The data, which were primarily secondary, were obtained from national zone authorities, World Bank Indicators and past research, as well as systematic searches for published and unpublished literature. For our purposes, secondary sources provided the opportunity to learn about what is already known, and what remains to be learned. Substantial use of secondary research helped to define the thrust or focus for possible subsequent research, by suggesting which questions needed answers that had not been realized from previous research, even as inconclusive as they generally appear.

What was evident was a lack of sufficient data and cases, as some of the countries did not keep comparable and consistent data. Amongst the countries there appeared to be a pattern of record keeping and data collection that seem inconsistent with the established objectives and outcomes. Further evaluation of these countries would also seem to suggest that there are some disparities in the implementation processes. There also appeared to be a lack of correlation between the type of Zones established and sectors' Gross Domestic Product (GDP) contributions. Much of the findings are generalizable to other African countries that lack empirical SEZ performance data (Curran et al., 2009; Farole, 2011; Namada et al., 2017; Watson, 2001). Based on the authors' evaluation, the impact of EZs in driving economic and private-sector development seems to be quite mixed across countries of the sub-region. The lack of sufficient data and reports affected the outcome of this research, especially in measuring/determining environmental outcomes when it comes to employment, GDP and Technological transfer, including measurable FDI. Notwithstanding these shortcomings, the overall picture that emerges from this study is one of the reasonable assessments of the evolution, rationalization, evaluation and impact of enterprise zones in SSA.

RESULTS

The five countries identified (Ethiopia, Ghana, Kenya, Nigeria and South Africa) have had rapid levels of proliferation of these Zones within a short space of time (Table 2). There seems to be a lack of correlation between the type of Zones established and sectors' Gross Domestic Product (GDP) contributions, such that a determination assessment could be somewhat tenuous. However, the structure of GDP in these countries, as seen in Table 3, indicates that these countries, except perhaps for South Africa, are still heavily dependent on primary production in contrast to the intended value addition expectation of the zones.

However, it would appear that for the different countries in the sub-region, the type of Zones established ranged from agriculture to manufacturing, to services, which seems more a reflection of the fundamentals of the particular stages of their economic development, which for many of them, is rather rudimentary, and not based on any discernible, measurable policy considerations. A review of the number of established ones (Table 2), in the selected countries, show seemingly inexplicable large numbers, with levels of haphazard, if incoherent duplications, in the establishment of specific Zones, that one wonders the policy and economic rationale. Indeed, there appears not to be a discernible pattern or sequence. For instance, Nigeria has a proliferation and duplication of over thirty-eight Zones, ranging from Federal to State, to Public/Private, to Private ownership; some under construction, some operational, and some just moribund declarations. This also goes for Kenya, with over sixty-one Zones, South Africa with eight, Ghana with four, and Ethiopia with eighteen. Interestingly enough, all the countries in the review in this research wear the same indistinctive, duplicative attributions. This raises the question as to whether there is the justifiable

Table 2. Number of enterprise zones in selected countries.

Country	No. of zones (2018)	Of which, under construction (2018)	Focus areas
Ethiopia	18	0	Apparel, textiles, leather, agro-processing, pharmaceuticals
Ghana	4	0	Textiles, Agro-Processing, ICT, petroleum
Kenya	61	0	Apparel, textiles, agro-processing
Nigeria	38	27	Wood processing, food processing, apparel, textiles, oil and gas
South Africa	8	0	Automotive, agro-processing, aluminum

Adapted from "Annex table 21. The Universe of Special Economic Zones (SEZs), 2018" by UNCTAD (2019). Authors' compilation of focus areas based on individual country SEZ authorities and SEZ program websites; DTI (2019), EIC (n.d.), EPZA (2017), GFZB (2012, 2014, 2017), IPDC (2015), NEPZA (2017). A total number of zones include both public and private zones.

national impetus for the accelerated development of these Zones.

Common features/attributes as rationale for zones' development

With possible substantial variations and perhaps few exceptions for South Africa, the countries in SSA functioned within the parameters of Mixed Economic Models and quasi-Command Economic Models, resulting naturally in vast State ownership of the different commanding heights economies. The percentage of State-Owned Enterprises (SOEs), almost in all cases, required huge statutory budgetary allocations to operate. These budgetary earmarks, while competing for national priorities, could not but affect resources' allocations in other critical sectors. The opportunity cost and lack of optimization have been distortive of these economies. The resultant waste and inefficiencies in their bureaucratic (mis)management were depletive, unproductive and resource-draining, thus an inhibiting drag on the overall national economies. This led, inevitably, to the intervention of the BWIs, in recommending the implementation of the widely applied SAP in the sub-region. It was believed that SAP would help manage public sector inefficiencies and waste, provide enormous scope to the private sector, attract more investment, bring in new technology and revive economic growth (Harsch, 2000; Sahn, 1996; Stiglitz and Squire, 1998). Table 4 shows transaction levels, values and share of divested SOEs, which were relatively insignificant in terms of original goal's realization.

Short of granting the massive loans these countries were requesting, the BWIs and other creditor institutions rationalized that by disposing of State ownership holdings and assets in otherwise non-performing investments, funds could be realized, thus reducing the loan requirements of these countries. SAP substantially entailed Privatization and Deregulation of these economies. In this context, privatization was intended to divest and transfer public/government holdings to the private sector, thus creating a citizens-based, wealth-creating, participatory investment ownership society – an economy that is both market-driven and globally outward-looking. Implicit in the notion of privatization was the explicit correlation of deregulation, the need to liberalize and dismantle bureaucratic strictures and supposed burdensome regulations that have become consistent with State ownerships in the sub-region.

SAP was a last desperate attempt at structural re-alignment and recalibration of these economies, hoping to create a more efficient, productive and responsive economic structure, that was more in line with globalization. Not too unpredictably, it became a creative exercise in futility, with the weak and sometimes non-existent national institutional structures and framework to complement and implement the (new) SAP initiatives. Implementation was gravely riddled with corruption such that privatized assets fetched less than the pre-public ownership values, even when adjusted for inflation, in current market value. In some cases, the outcome was a mixed bag (Appiah-Kubi, 2001; Jones et al., 1998; Temu and Due, 1998; 2000; Nwankwo and Richards, 2001). The failure of this widespread sub-regional exercise has been attributed to a few reasons, prominent amongst them, the rentier state and lack of creation and reinforcement of the institutions that underpin and guide proper market renaissance. For example, as in 1999, Nigeria had over 1200 SOEs, which had been losing millions of dollars annually. The history of privatization and deregulation in Nigeria is one that was woefully replete with mismanagement and corruption (Okpanachi and Obutte, 2015). In January 2000, a similar sentiment was expressed in Kenya where several Members of Parliament and opinion-leaders interviewed, said they deplored the inefficiencies and rampant corruption in the significant SOEs, but feared that privatization would only enlarge and entrench theft and mismanagement (Nellis, 2005).

The mediocre, corrupt, and poorly structured implementation of SAP failed to realize its primary and

Table 3. Structure of GDP in selected countries (%).

Country	Agriculture					Manufacturing					Services				
	The 1960s	The 1970s	The 1980s	The 1990s	The 2000s	The 1960s	The 1970s	The 1980s	The 1990s	The 2000s	The 1960s	The 1970s	The 1980s	The 1990s	The 2000s
Ethiopia	..	..	51.10	53.63	41.87	..	..	4.56	4.76	5.03	..	..	33.68	31.78	39.37
Kenya	34.57	31.65	28.01	26.74	24.41	9.69	10.62	10.35	10.02	10.97	..	..	..	..	50.00
Ghana	40.01	51.26	51.92	39.52	33.43	11.37	11.09	7.98	9.19	8.61	..	..	33.43	30.61	36.16
Nigeria	..	..	17.83	24.45	27.14	..	..	19.96	18.62	10.59	..	..	47.21	40.37	45.46
South Africa	9.56	6.86	5.04	3.77	2.83	20.79	20.71	21.20	19.34	16.02	49.03	49.29	47.15	55.73	59.66

Authors' compilation from World Development Indicators (WDI) from World Bank (2019a, b, c). Data is based on World Bank national accounts data, and OECD National Accounts data files for the period 1960-2010. Two dots (..) indicate that the information is not available.

Table 4. Privatization record in selected countries 1991-2001.

Country	Number of transactions	Sale value (US$ mn)	Share of total SOEs divested (%)
Ethiopia	10	410	6
Ghana	181	936.5	69
Kenya	189	381	79
Nigeria	30	893.5	6
South Africa	8	3151	...

Adapted from "Privatization in Sub-Saharan Africa: Some Lessons from Experiences to Date" by Buchs (2003) EconWPA.

original purpose, namely liberalizing the "state-dominated" economies and untrapping the funds mortgaged to the various non-performing SOEs. What was apparent was the insufficient resource generation through SAP, as initially envisaged. This failure led to the scramble for alternatives. Due to the fact that SAP was a mixed bag of outcomes in terms of realizing the original objectives, there was an understandable reluctance on the part of lenders (BWIs and other institutional lenders), who would compel these

countries to seek funding and resources' alternatives, hence the rather rapid proliferation of the Zones in the late 1990s and early 2000s.

What make the SSA experience in proliferation peculiar is both the underlying premises for the Zones' establishment (export-oriented/focused, lacking in any domestic integration or complementarity) and lack of supportive and reliable data from other national/regional experiments. It is therefore debatable whether this rather narrow (export-oriented focus) affected, or

indeed inhibited, a more robust policy articulation and implementation that could have benefited and accommodated some domestic industries' leveraging of the Zones presence and its spillover effects. According to Farole (2011), EPZ activities were initially focused exclusively on export markets; investment was restricted to foreign capital, and activities were limited to manufacturing. EPZs have since evolved dramatically since the 1990s, and the types of activities permitted have expanded significantly.

Table 5. Economic Impact of Zones in Ghana for the period 2008-2014.

Ghana	2008	2009	2010	2011	2012	2013	2014
Investment (US$m)	315.84	214.83	212.33	224.64	247.51	279.45	167.47
Zone Exports (US$m)	1,286.91	1,667.57	1,690.70	1,966.72	1,830.30	12,268.18	2,360.22
Employment	28,595	28936	29,798	30,080	30,383	31,005	30,271

Source: GFZB (2014).

Table 6. Economic Impact of Zones in Kenya for the period 2008-2017.

Kenya	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Investment (US$m)	313.7	278.0	297.4	298.0	456.5	557.4	502.9	490.2	876.6	921.4
Contribution to GDP (%)	2.29	1.92	2.2	2.76	2.75	1.06	1.06	1.04	0.96	0.87
Zone Exports (US$m)	406.1	309.6	366.0	439.9	472.8	515.9	652.6	620.1	632.0	587.3
Contribution to national exports (%)	8.14	6.94	7.08	7.64	7.72	8.84	9.56	10.48	11.10	10.22
Employment	30,658	30,623	31,502	32,464	35,929	40,433	46,738	50,899	53,565	55,486
Contribution to national employment (%)	0.3	0.29	0.29	0.28	0.28	0.30	0.32	0.33	0.33	0.32

Investment and export data for 2008-2017 converted from the local currency to US$ using the World Bank's Official Exchange Rates.
Source: EPZA (2012, 2017).

However, due to bureaucratic and regulatory bottlenecks, this rather belated expanded inclusion has had little impact on the broader economy (World Bank, 2020).

A review and evaluation of available research and data for the selected countries (for this study) show indistinguishable differences in terms of policy articulation, focus, and processes implementation. Several conclusions could, therefore, be drawn; one that the proliferation was not due to any discernable effectiveness or replication of successful models in the sub-region. If anything, it appears to be evolving experimentation with hopeful outcomes. Two, the monolithic composition of these economies, being fundamentally primary producers, made unrealizable any structural changes in their system to accommodate a considerable shift, by the introduction of the Zones without support infrastructural enhancements or thoughtful alignment with the broader national economies. Third, the outcome may have been different had the focus of the Zones initiatives been secondary value addition to the original products, predominant in the sub-region. As it were, it seemed a monumental and unrealistic leap from zero to 100, without support infrastructure and absorptive capacity.

The authors have selected five countries, Ethiopia, Ghana, Kenya, Nigeria and South Africa, as reference countries for this study, based on attributive commonalities amongst them (Tables 5 to 8). They appear similarly constrained, measured against all the major development indices. It is important to note here that some of these features or attributes, including in-countries economic dynamics, may not be uniformly common or prevalent, to the same degree, in all the countries, at the time the Zones establishment policies were made. It is the opinion of the authors that some of the more critical considerations may have been: Market Proximity, Factors Limitations and Comparative Advantage, amongst others, including their vast debt ratio, which may also have been a factor. With the possible exception of South Africa, these countries were part of the Heavily Indebted Poor Countries debt relief program of the BWIs (Richards et al., 2003).

Assessing the performance of the zones in selected countries

The summary of our findings in respect of the overall performance of the five countries is presented below. Our data, which were primarily secondary, were obtained from national zone authorities, World Bank Indicators and past research, as well as systematic searches for published and unpublished literature. The consensus is that the Zones initiatives have been less than successful in much of SSA, in reasonably realizing the primary objectives. The underperformance of African zones has been acknowledged by previous research, noting the possible exception of Mauritius, and partially that of Kenya. According to Baissac (2003), other than those in Mauritius, Tunisia and Egypt, African EPZs are marked by "marginal employment impact, low FDI, absent linkages with the domestic economy, and limited foreign exchange contribution"(p.6), and that given the costs of building and maintaining EPZs, "the total balance for the

Table 7. Economic Impact of Zones in Nigeria for the periods 2005-2006 and 2008.

Nigeria	2005-2006	2008
Investment (US$ billion)	1.2	N/A
Zone Exports (US$ billion)	1.6	n.d.
Employment	111,375	21,156

Source: Boyenge (2007), Farole (2011).

Table 8. Economic Impact of Zones in South Africa for the periods 2005-2006, 2008 and 2015.

South Africa	2005-2006	2008	2015
Investment (US$ billion)	n.d.	n.d.	1.7*
Zone Exports (US$ billion)	n.d.	n.d.	n.d.
Employment	535,195	n.d.	73,000**

*Total estimated value during the period 2005/06 to 2014/15. **Number of jobs created as at 2014/2015.
Source: Boyenge (2007), Farole (2011), DTI (2015).

region, as a whole, may well have been negative" (p. 6). Although many resources have been expended on African zones, the level of export, employment, and FDI generation has been low. Estimates of direct employment and exports from the Zones in SSA in the period between 2004 and 2007 are estimated at 1 million indirect employment and about $8,605 million respectively (Cirera and Lakshman, 2017; FIAS, 2008). According to Zeng (2015), the available evidence suggests that SSA's experience with traditional EPZs, and IZs have been relatively poor in terms of both employment generation and export performance. According to Stein (2012), most zones in Africa have remained rather small, with few linkages to the local economy and small foreign-exchange earnings. The main problem is that many zones in SSA have been driven by aid agencies and vested interest, with promises of exclusive access to foreign markets, which have proven to be quite limited, particularly after the expiration of the Multi-Fibre Arrangement in January 2005. In contrast, in many of the successful export zones in Asian countries, EPZs have been part of a broader industrial policy where zones are not an end in themselves but a component of the broader strategy to transforming institutions to improve developmental competitiveness and industrialize the country (Zeng, 2015). Besides purposeful national policy prioritization, infrastructural support has been aligned with the initiative.

Although case studies have suggested possible spillover effects associated with the establishment of some EZs (Creskoff and Walkenhorst, 2009), that does not appear the case in SSA. The socioeconomic objectives for creating these zones have not been realized. Besides, there is a dearth of current, adequate, and actionable research on the EPZ performances in African countries that can be used for decision making,

which in itself is telling, in rationalizing the impetus that has informed proliferation. Consequently, there is a need for recent, high-quality data for SEZs research and analysis by stakeholders. This is true because the choice of countries analyzed by many other authors, was mainly based on the availability of data on these countries. It is important to note that these findings are generalizable to other African countries that lack empirical SEZ performance data (Curran et al., 2009; Farole, 2011; Watson, 2001).

Ethiopia

Although comprehensive data are currently unavailable for Ethiopia, the authors have provided a brief country profile, for augmentation. Ethiopia, a one-party state with a planned economy, and a GDP of about USD 80.87 as at 2017, grew at a rate of between 8 and 11% annually in the period (Central Intelligence Agency, 2019; World Bank, 2019d). Although agriculture provides more than 70% of Ethiopia's employment, services now account for the largest proportion of the country's GDP (Central Intelligence Agency, 2019). The country has made progress in reducing extreme poverty but continues to experience widespread poverty due to rapid population growth and a low starting base (Central Intelligence Agency, 2019). Unemployment levels stood at 18 and 17.5% for 2011 and 2012 respectively. Ethiopia's GDP per capita grew from USD 203.56 in 1981 to USD 768.01 in 2017 (World Bank, 2019e). However, the period between 1991 and 2004 saw declining GPD per capita from $271.39 to a record low of USD 111.93 (World Bank, 2019e). The implications of these somewhat contradictory statistics, especially concerning growth rates and its translation into internal resources

generation, may help explain the added urgency for Zones' establishments in that country.

African export zones in perspective

The lack of dependable and affordable utilities is a grave impediment for investment in African SEZs. A compilation of 2009 data from World Bank Enterprise Surveys and SEZ Investor Surveys conducted in the same year reveals that, except for South Asia, Africa has the worst electricity supply uptime with over 25% of electricity generation coming from generators, and over 5% of additional cost and lost sales as a result of electricity downtime in businesses (Farole, 2011). Indeed, the situation has not changed, rather degenerated rapidly in recent times, according to the Africa Energy Outlook 2019 (IEA, 2019). The average monthly downtime as a result of power outages in Kenya's, Nigeria's, and Ghana's SEZs are 11 h (32 h for the entire country), 136 h (206 h for the entire country), and 34 h (120 h for the entire country) respectively. The average time to secure electricity connection in days in Ghana's, Kenya's, and Nigeria's SEZs are 51 days (24 days for the entire country), 22 days (41 days for the entire country), and 19 days (8 days for the entire country) respectively (Farole, 2011). Even though, electricity supply and customs clearance durations within African zones is 50 and 30% respectively better than those outside the zones, these improvements, still fall below that obtainable from other non-African SEZs, leading to a below-par or substandard investment climate.

It has also been determined that access to reliable transportation infrastructure, is also a critical determinant of investment in both African and non-African SEZs. Indeed, according to the Global Competitive Index, a correlation exists between the quality of the road and the quality of infrastructure in African zones. The quality of roads in Nigeria, Kenya, and Ghana are 112, 91, and 76, respectively. Similarly, the quality of port infrastructure in Nigeria, Kenya, and Ghana are 112, 84, and 69, respectively (Farole, 2011; World Economic Forum, 2009). The regulatory environment of business is most unconducive in all of the regions. The process of establishing and conducting business in much of the sub-region is corruptly bureaucratic, time-consuming, and redundant. This has the negative effect of increasing the costs and risks of successfully running any business while destroying the incentives and competitiveness of African zones (World Bank, 2019). A robust legal and regulatory environment in a country is a strong indication of the likelihood of success of its zones about conflict resolutions, environmental and labor laws compliance, etc. (Curran et al., 2009; World Bank, 2019; Watson, 2001).

It has been suggested that investors consider a few factors, in addition to this five when deciding investment locations: utility quality and cost; transportation infrastructure access; business regulatory environment; trade preferences and tariffs; and corporate tax levels. Overall, the EZs in Kenya and Lesotho outperformed those of Ghana, Nigeria, Senegal, and Tanzania respecting the five most important factors responsible for attracting investments to African EZs. Except for Mauritius, and possibly Kenya, Madagascar, and Lesotho, there is consensus among researchers and stakeholders that African zones have performed below expectation (Curran et al., 2009; Farole, 2011; Watson, 2001).

DISCUSSION

Even though the majority of the countries in our review have performed below expectations, they have continued to proliferate. The investment climate, infrastructure, and levels of national competitiveness, etc. are significant determinants of the success or failure of African zones. The zones examined in this study have experienced little or no growth and even declining growth. For countries in the study who have employed EZs as a crucial policy instrument to increase exports, employment, and foreign investment, the results are relatively indiscernible outcomes. However, these laudable aims have not been attained as a result of several factors such as inadequate high-quality infrastructure, poor policy and economic integration with the domestic market/economy, skilled human capital scarcity, poor governance, and policy restrictions or inconsistencies (Bogoviz et al., 2016; Farole, 2011). This is evident in all of the countries in this evaluation, without exception.

Based on our evaluation, the impact of EZs in driving economic and private-sector development seems to be quite mixed across the countries in the sub-regions. Except for Mauritius, little or no empirical data or current research exists that will enable policymakers to assess the performance of EZs in Africa and the factors (policies and practices) that enable or hinder economic growth and development in the areas of employment, diversification, foreign investments, exports, and other EZ goals and objectives. This is true because the few case studies that tend to address this issue are over 20 years old and are limited in the number of countries covered. Besides, most African countries tend not to keep accurate and reliable data, especially when such data contradict government's figures and highlight poor performance (Farole, 2011; Namada et al., 2017; Watson, 2001).

Overall, it would appear from available data and research, which substantially is inconclusive, that the orthodoxy that informed the creation and proliferation of the Zones were rather superficial and ungrounded. They would appear to have been informed by markets and

economic dynamics that were unsuitable or perhaps ill-prepared for the environment into which they were introduced. These do not appear to be decisions grounded on the progressional national economic developmental models in the traditions of the linearity of stages of economic development (Rostow, 1991). Instead, they appear to be the exigencies of different policy alternatives, poorly conceived and inconsistently hurriedly implemented, in the desperation of national economic redemption alternatives. The dearth of infrastructure is consistent with the overall constraint and varying levels, degrees and capacity in all the zones. In general, power, gas, roads, ports, and telecommunications are the key constraints. Given the significant investments required for the zones, a robust committed engagement from government and active public-private participation is essential.

The emergence of "factory Asia", global production networks, and other more regional trade agreements and arrangements have negatively affected the EZ in Africa, for their lack of competitiveness and comparative labor cost advantage. It would appear that the EZs, in conception and implementation, was not and could not have been a proper "fit" for sub-Saharan Africa, in the current state of its overall support infrastructure, lacking as it were, in critical components. It would again, appear a case of adopting and implementing a one-size-fits-all initiative that is substantially unsuited for their markets and economy. The argument here is that an effective EZ structure could have been tailored to mirror the peculiarity of the sub-region's economic development stages. This would be organized and focused on their enormous natural endowments or resources and maximizing them, rather than by the "Assemblage Factory" of imported components, they have become.

Indeed, the question is whether EZ is a feasible, viable model for the sub-region in the attainment or realization of the market and economic development impetus this model originally envisaged? The lack of institutions and support infrastructure would suggest not. Over several years, especially from the early eighties, much of the sub-region have experimented on several economic and market development models that were unviable. What seems evident is that it is a sub-region still in search of viability and (economic and market) redemptive alternatives, in a fiercely competitive global marketplace. What could that possibly be? However, to the extent that few case studies have suggested spillover effects associated with the establishment of some EZs (Creskoff and Walkenhorst, 2009), which has not been particularly evident in the region, a focus on assessing these effects may be warranted, as a new research area. Indeed, it has been suggested that positive spillover effects could come in the form of enhanced economic productivity, newly available technology, and local social welfare effects on the domestic population (FIAS, 2008; Ge,

1999; Wang, 2013). This would only happen with a more realistic, deliberately thought-out and evaluatively integrated and implemented "new" initiative; one that is not separate, but complementary and aligned with the national economy

Conclusion

The introduction of new models or terminology called Industrial Parks. At the same time, nomenclatically novels substantially embody all the attributes of a typical Economic Zone, which begs the question, the relevance and significance of the new terminology. Unanswered is whether this is a new usage that encompasses new and robust attributes lacking in the original contemplation. Regardless, it seems an initiative is substantially lacking in realizability and sustainability. Evidently, because of in-country peculiarities and disparities between them, it has been ill-advised for all the countries in our evaluation to adopt seemingly common/similar objectives and parameters in the development of their EZs, when their national needs and in-country constraints and imperatives would have dictated, perhaps something different. This is especially the case due to a dearth of data and statistics, where, even though the establishment of EZ seems to have been necessitated by common denominators, growth, employment, FDI, etc.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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