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## IDENTIFYING CRITICAL SUCCESS FACTORS FOR UNIVERSITY BUSINESS INCUBATORS IN SAUDI ARABIA

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**Abstract.** Business incubators are a major tool in entrepreneurial eco-system of any country and forms the backbone of economic development initiatives. One of the greatest adaptations of business incubators came through universities especially public sector universities. This is due to the university's understood responsibility of supporting science and society development and ultimately providing all the new businesses' requirements in science and technology. Saudi Arabia has taken robust measures to develop and improve the local entrepreneurial eco-system by establishing and nurturing business incubators, especially university business incubators. In a small frame of time, Saudi business incubators have produced many innovate solutions for the technology, economic and social challenges. Due to multifaceted functionality and lack of standard evaluation criteria the business incubator performance became very important topic in Saudi Arabia. The purpose of this research is to develop critical success criteria for business incubators in Saudi Arabia. Survey methodology was employed to collect the data. Data were analyzed in many ways. Firstly, based on the survey results, list of success criteria for business incubators performance was presented. Secondly, descriptive analysis shows that top three critical factors include (a) coaching and mentoring hours, (b) number of services and supports offered; and (c) access to funds in terms of total attractive investment. While the least important factors considered were (a) affiliation with the university, (b) time limit to tenancy, and (c) numbers of IPOs launched. Thirdly, factor analysis summarizes all the critical success factors for university business incubators and culminates into five big factors, including (a) support services; (b) network support; (c) financial support; (d) economic development; (e) alumni success. Finally, cluster analysis shows there are two major cluster groups in the data: (a) 'employees' of the incubators and (b) 'incubatees'. This research provides guidelines and critical success criteria for business incubators operating in Saudi Arabia or elsewhere.

**Keywords:** Business Incubators; Accelerators; University Business Incubators; Saudi Arabia; Success Factors

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### 1. Introduction

Over the past two decades, Saudi Arabia has been actively engaged in educational expansion and investment. As a result of this direction from the Government, many graduated students from different fields and specializations have graduated. However, it is implausible that the Government will provide the required jobs for all those graduated students. Moreover, the private sector in Saudi Arabia is not developed enough to address this gap

between the Government and the huge number of graduated students. As a solution to this problem, the Government has developed a new initiative to establish a business incubator as part of universities throughout the Kingdom. The incubators have been increased very rapidly after launching the 2030 Vision by the Government of Saudi Arabia. There are over 35 business incubators working under the universities as non-profit organizations. Different names are assigned to these incubators, such as 'business incubators', 'accelerators' 'accelerated business centers', and 'business hub center'.

## **2. Theoretical background**

There are many definitions of business incubators (BI) in the literature. The most prominent definition comes from the National Business Incubation Association (NBIA). It defines business incubators as a catalyst tool for either regional or national economic development that has been formulated to enhance the growth rate of the new companies by providing all the required support and services or overcontrol new businesses by managing them through incubation and networking (NBIA, 2021). Other researchers have also provided useful definitions for BI as following. The business incubator is the organization that provides the logistic requirements to the business project in the early stages, such as place and the required recommendations and guidelines; a suitable space and all required assistance in the early stages for the targeted firm; the required support for the firm in the early stages (Mian, 2014). The support may include office service, coaching, and communication (Hansen et al. 2000); governance to the firm in the early stages and provides the required guidance and recommendations (Manan & Yunos 2001); support the new project and link it to the appropriate network, along with the offering of the required advice and recommendation, especially in the first few years of the business start-up (Mian, 1997).

Business incubators have evolved over a period of time and can easily be classified into four generations based on the commonalities among services offered. The first generation of the business incubator, which has been stated from 1970 till mid-1990 "traditional incubator." The main objectives of these incubators were to enhance the national economy by improving entrepreneurship and small firm. The Government normally controls this type of incubator. Additionally, the universities and private sector contribute by providing the space, and the major revenue is by the rent of space. These incubators were based on economies of scale and offer office space and shared resources. Important characteristics were (a) reactive support, (b) landlord-tenant relationships, and inclination towards real estate management (Allahar, & Brathwaite, 2016). The second generation of the incubator which started from 1990 till 2000. This type of incubator is also named as an incubator without walls or a new economy incubator. Technology development is the main target of this incubator without the interest of job creation. The revenue of this incubator is from the equity of companies via IPO. This generation was based on accelerating the learning curve and used to provide coaching and training support in addition to first-generation services. Prominent characteristics of the generation were (a) advisory services and (b) proactive support (Allahar, & Brathwaite, 2016). The third-generation incubators were started in early 2000. These incubators were based on access to external resources, knowledge, and legitimacy and used to offer access to technological, professional, and financial networks (Bruneel et al., 2012). Prominent characteristics of the generation include (a) access to funding; (b) co-venturing; (c) business accelerators; (d) coaching; (e) mentoring; and (f) technology labs/parks (Allahar, & Brathwaite, 2016). The emergence of business accelerators during the third generation of business incubators can be seen as a catalyst for the growth of business incubators. Business accelerators are a series of programs that give developing companies access to mentorship, investors, and other support services that help them become stable, self-sufficient businesses. Start-ups that use the services of business accelerators are typically those having moved beyond the earliest stages of getting established. Typically, business incubators target local start-ups and provide office space to reduce rent, while accelerators offer fixed-term cohort-based programs. Mentoring, education, technical assistance, and seed funding are some of the common characteristics (Ganamotse et al., 2017). The fourth generation of business incubators is still evolving and based on the concept of business incubators accreditations and internationalization (Khalid et al. 2014). Prominent characteristics of the generation include (a) international business incubators; (b) accredited business incubators; and (c)

international co-incubation (Allahar, & Brathwaite, 2016). One thing is consistent among all generations and among all definitions of business incubators, i.e., business incubators are companies that help new ideas, novice entrepreneurs, and/or new start-up companies to develop by providing services such as management, training or office space, more precisely they provide support to early-stage start-ups (Bruneel et al., 2012; Khalid et al., 2014).

One of the greatest adaptations of business incubators and accelerators came through universities. Although teaching entrepreneurship is not directly linked with business incubators and accelerators as part of their curricula (Siddiqui, & Alaraifi, 2019) but graduates' risk aversion and work effort are positively influenced by the university business incubator and entrepreneurship education programs (Guerrero et al., 2020). Now universities understand their responsibility of supporting science and society development and ultimately providing all the requirements for the new business in science and technology to play their most important roles as university business incubator (Nicholls-Nixon et al., 2020). Literature provide further support to the application and implementation of UBIs throughout the globe i.e., University business incubator (UBI) works as hub to market; university; research and technology (Pellegrini, & Johnson-Sheehan, 2020); UBIs are considered as an effective tool used to compensate the weakness in the traditional business incubators (Grimaldi, & Grandi, 2001); UBIs also provide the required support to university professors, students, alumni to start businesses as entrepreneurs (Gozali et al, 2018); UBI's role is not only to provide the required support to the accelerate the growth for the new businesses in the market but also provide the required training for the university students and marketing university's innovation (Nicholls-Nixon et al., 2018); UBIs are considered as the most crucial element of entrepreneurial ecosystem (Nicholls-Nixon et al., 2020); UBI can utilize all available resources and the faculty experiences to support the new firm during the start-up period in the market (Lendner, & Dowling, 2007); UBI establishes effective networks and creates value for the incubatees to survive in the market. It also provides a chance of getting fund and support to incubatees (Cooper et al., 2012); UBI has to consider the differences of cross-border and cross-cultural organizations in order to get acceptance of incubator concept, especially in developing centuries (Dahms, & Kingkaew, 2016); UBI is a tool used to enhance national economic growth. Normally, UBIs are targeting the technology firms in early stages (Somsuk, & Laosirihongthong, 2014); UBI provide the required offices, tools, and the consultation service for the new firm; works as mediator between the university and the industrial market and creates the required link to support the university research (Wonglimpiyarat, 2016); UBI provides varieties of facilities and image to tie with university image and it provide incubatees the ability to survive in the market (Grimaldi, & Grandi, 2001). On the other hand, literature also provide significant critique to the UBIs. For example, UBI's support activities for entrepreneurs is dependent on UBI's manager's experience (Redondo, & Camarero, 2017); UBIs need to consider the organizational and cultural differences in different countries in order to get acceptance of incubator concept, especially for developing centuries (Dahms, & Kingkaew, 2016); UBIs are under great pressures to evaluate the UBI performance and the rationalization of UBI's fund (Nicholls-Nixon, & Valliere, 2019). Even research on UBIs also came under scrutiny. For example, most of earlier research have ignored to study society funding to the entrepreneur through UBIs (Redondo, & Camarero, 2019); most of the earlier research on UBI activities failed to link the UBI's activities to the different generations of business incubators and their offerings despite the fact that UBI works as mediator between the university and the industrial market and create the required link to support the university research (Wonglimpiyarat, 2016).

A very thin amount of literature is available on the critical success factors for UBIs. Firstly, a seminal work on UBI's success factors (Mian, 1994, 1996a, 1996b 1997), reviewed and upgraded success factors (Verma, 2004), and Saudi model for technology incubators (Binsawad et al., 2019); six-factor model including age and quality of facilities, credits and rewards, entry criteria, exit criteria, funding support, good system and infrastructure Gozali et al., 2018); four-factor model including human resources, financial resources, technological resources and organizational resources (Mavi et al. 2019) and most recently used success

criteria for the ranking university business incubators (UBI Global, 2020). All models have their merits and demerits. Mian’s model (1994) is very old and belongs to first generation of business incubators but does not link to subsequent generations and needs updating. Verma’s model (2004) is also old and belongs to the second generation of UBI (Verma, 2004). Some of the research on university business incubators and their performance were excluded from this research as they were based on students’ entrepreneurial intentions; not based on actual incubator experience; for example (Yamockul, Pichyangkura, & Chandrachai, 2019) or having methodological issues (Mavi, et al 2019; Gozali et al, 2018). Binsawad et al. (2019) is a Saudi Technology business incubator model is based on personal perspective, not organizational criteria, and cannot be used for UBI performance evaluations and it does not include the attributes of the fourth generation of UBI (Binsawad et al. 2019). UBI Global model (2020) for UBI ranking is more appropriate but lacks features of earlier generations of UBI (UBI Global, 2020). It became the criteria to rank the university incubators in the world. Every year the UBI provides a report started the top business all over the world based on three categories. The first categories are the top changers. The second categories are the recognize the most promising incubator and the last category is the ranking for university incubator over the world. Every year these is around 70 counties involve in the incubator rang with total number of 300 incubators. These samples contain the most important and popular sector in the business. UBI framework to rank the incubator contain of three importins categories, the values of ecosystem, value for client and attractiveness. These three categories spared to seven indictor which use to measure the incubator performance. The seven indictors are economy enhancement, access to funds, incubator offer, talent retention, competence development, post-incubation performance and access to the network (UBI Global, 2020).

During the last two decades there has been an increasing effort by the Saudi authorities to improve the entrepreneurial ecosystem in the country establishing the business incubators and accelerators (Al-Mubarak & Busler, 2010). Saudi vision 2030 has selected entrepreneurship as future roadmap for economic development and employment creation (Saudi Arabia, Vision 2030; [www.vision2030.gov.sa/en](http://www.vision2030.gov.sa/en)). In addition, Government has established the Small and Medium Enterprise Authority (SMEA; [www.monshaat.gov.sa/en](http://www.monshaat.gov.sa/en)), as part of the Vision 2030 and this authority has helped to establish new business incubators and support and evaluation the performance of existing business incubators. The Kingdom of Saudi Arabia began to support its entrepreneurial ecosystem in the last decade, with different governmental initiatives and the involvement of the private sector. Such initiatives include the Saudi Business Incubator Network initiative (Salem, 2014). Another business incubator that has been established nationally to promote technology and innovation is BADIR technology business incubator (Khorsheed et al., 2014). This indicates that the Saudi government agencies responsible for shaping entrepreneurship policies must acknowledge the need to integrate business incubators into economic policy reforms (Salem, 2014). Table 1 provides a list of national business incubators and accelerators in Saudi Arabia. University business incubators have recently been introduced in Saudi Arabia (Siddiqui, Siddiqui, & Alaraifi, 2018) and almost all universities have launched university business incubators (UBI) as not-for-profit organizations.

**Table 1** List of National Business Incubators participated in this study

No	Business Incubator	City	No	Business Incubator	City
1	BADIR - King Abdullah City of Science and Technology (KACST)	Riyadh	12	FLAT6LABS	Jeddah
2	Misk 500 - MISK Foundation	Riyadh	13	InspireU	Riyadh
3	9/10th - King Abdullah University of Science and Technology (KAUST)	Riyadh	14	Tamakkun BA	Riyadh
4	E3qlha - First women's business incubator	Riyadh	15	Entertainment BA	Riyadh
5	Bab Rizq - Abdullatif Jameel Motors	Riyadh	16	I-be Hub	Riyadh
6	Jeddah Valley	Jeddah	17	Inspire	Riyadh
7	Dhahran techno valley	Dharan	18	Startups House	Riyadh
8	Riyadh Taqnia venture	Riyadh	19	Oqal	Riyadh
9	Riyadh Valley	Riyadh	20	Raz	Riyadh
10	Saudi Credit and Savings bank	Riyadh	21	Riyada	Riyadh
11	Saudi Venture Capital	Riyadh			

Table 2 provides list of UBIs and parent universities in Saudi Arabia. In Saudi Arabia, not many UBIs are performing at par and there are no centralized acceptable criteria available for UBI’s success. One of the obvious reasons is the fact that some of UBIs in Saudi Arabia are still in infancy stages and restricted to provide only first-generation services. Hence their progress in terms of alumni success or financial performance cannot be measured. This requires an urgent task to develop the criteria for UBI success in Saudi Arabia.

**Table 2** List of University Business Incubators participated in this study

No	University Business Incubator and Parent University	City
1	Innovation and entrepreneurship center - Business incubator and accelerator, Al-Baha university	Al-Bahah
2	Najahat – Business incubator, King Faisal University	Al-Hasa
3	IAU Entrepreneurship center - Business incubator and accelerator, Imam Abdurrahman Bin Faisal University	Dammam
4	Entrepreneurship institute - King Fahad for University of Petroleum and (KFUPM)	Dammam
5	Hail university start-up accelerator - Business incubator and accelerator, Hail university	Hail
6	Jnnov8 – Business incubator and accelerator, Jazan University	Jazan
7	Business Innovation and Entrepreneurship - Business incubator and accelerator, Effat university	Jeddah
8	Sahabat Alimam – Business incubator, Imam Mohammed bin Saud Islamic University	Madinah
9	Bab-Al-Madinah – Business incubator & accelerator, Islamic University of Madinah	Madinah
10	Wadi Makkah – Business incubator and accelerator, Umm Al-Qura University	Makkah
11	Centre of creativity and entrepreneurship – Business incubator & accelerator, King Abdulaziz University	Riyadh
12	Innovation and economic development –King Abdullah University of Science of Technology (KAUST)	Riyadh
13	Hikma incubator, King Abdullah University of Science of Technology (KAUST)	Riyadh
14	King Salman Institute for Entrepreneurship - Business incubator and accelerator, King Saud University	Riyadh
15	Innovation and entrepreneurship center - Business incubator and accelerator, University of Taif	Taif

**3. Research objective and methodology**

The objective of this research is to identify critical success factors for UBIs in Saudi Arabia. Population of this research is considered to be all stakeholders all-inclusive. Respondents selected for this research includes graduates / alumni of UBIs successfully running their start-ups; senior employees of business incubators; incubates associated with different business incubators regardless of their stage; field business experts involved in teaching, consulting or other support activities for business incubators in Saudi Arabia. Although judgmental sampling technique was employed to collect the data, but all efforts were made to make the sample as true representative sample and include all possible groups of respondents. Questionnaire was developed using multi-stage method. Firstly, individual items were drawn from the literature review including Verma (2004), Mian (1996) and most recent UBI Global (2020). Table 3 presents a comparative account of different models used to provide success criteria for Business Incubators.

Four models including Mian (1994), Verma (2004), Binsawad et al (2019), and UBI Global (2020) were presented through semi-structured interviews to experts from the field. Participants were recruited through networking events, LinkedIn profiles, and snowballing techniques. A total of five experts from different institutions were interviewed, representing one from Monshaat (small and medium enterprise regulatory authority), two from the largest business incubators in Saudi Arabia and two from leading business schools responsible for university business incubators. All participants are well-known and were over the age of 35 and have reasonable experience in the field.

After interviews with all stakeholders three important decisions were made; (1) items from Binsawad et al (2019) inventory were dropped for further research for many reasons; (a) items were based on personal perspective not organizational perspectives; (b) criteria used for evaluation of UBIs was focused on academic research and cannot be used for UBI performance evaluations; (c) items do not include the attributes of fourth generation of UBIs; (d) items could not be validated during the research and cannot be generalizable for field research. (2) Although, UBI Global (2020) model is the most recent and updated model for critical success factor business incubators but may

not be a suitable option to measure critical success factor for Saudi UBIs due to reasons mentioned above. (3) There is a need to develop critical success factors for Saudi UBIs spreading over all generations of UBIs and meeting the needs of UBIs in different stages of their evolution. Table 4 presents the nine dimensions having 28 items selected for further research stages dully validated by six experts from the field.

**Table 3** Comparison of different models used to provide success criteria for Business Incubators

Mian (1994)	Verma (2004)	Binsawad et al (2019)	UBI Global (2020)
<b>A. Shared office services</b>	<b>Shared Physical Services</b>	Management Support	<b>Economy Enhancement</b>
1. Photocopier	a. Security	IT Support	a. Jobs created & sustained (#)
2. Telephone	b. Computers	Reward	b. Sales revenue (\$*)
3. Facsimile (Fax)	c. Conference room	Self-Efficacy	c. Graduates (#)
4. Conference room	d. Custodial services	Interpersonal Trust	d. Self-generated revenue (\$*)
5. Security	e. Photocopier	Enjoyment in Sharing	<b>Talent Retention</b>
6. Receptionist	f. Furniture and equipment	Knowledge-Donation	a. Client start-ups accepted (#)
7. Custodial maintenance	g. Library	Knowledge- Collection	b. Graduate retention (#, %)
8. Personal computer	h. Telephone equipment	Diffusion of Innovation	<b>Competence Development</b>
9. Shipping/receiving	<b>Shared Business Support</b>	Complexity	a. Services offered (#)
10. Mail sorting	a. Photocopy	Compatibility	b. Coaching & mentoring hours (#)
11. Word processing clerical	b. Receptionist	Relative Advantage	<b>Access to Funds</b>
12. Cafeteria/lunchroom	c. Typing	Creativity Intrinsic	a. Total investment attracted (\$*)
<b>B. Business assistance &amp;</b>	d. Clerical	Expertise	b. Average investment attracted (\$*)
1. Govt. grants and loans	e. Filing	Creative Thinking Skills	c. Seed funding attraction (#, %)
2. Business plan	f. Mail Services		<b>Access to Network</b>
3. Legal/govt. regulations	g. Word Processing		a. Partners (#)
4. Tax assistance	h. Off-hours answering services		b. Events (#)
5. Accessing outside capital	i. Audio-visual equipment		c. Alumni engagement (#, %)
6. Marketing	j. Shipping & Receiving		<b>Program Attractiveness</b>
7. Accounting	<b>Financial Consulting</b>		a. Internal applications (#, #/spot)
8. Personnel recruiting	a. Business Taxes		b. External applications (#, #/spot)
9. Business connections outside	b. Risk management		c. Sponsorship attraction (\$*)
10, Business connections	c. Govt. Grants & Loans		<b>Post-Graduation Performance</b>
11. Rent breaks	d. Govt. Contract preparation		a. 1-year survival rate (%)
	e. Equity & Debt Arrangements		b. 5-year survival rate (%)
	f. Export Development		c. High-growth enterprises (%)
	<b>Management Assistance</b>		d. Qualified exits (#)
	a. Business Plan Preparation		
	b. Employee Relations		
	c. Advertising & Marketing		
	d. Health & benefit packages		
	<b>Professional Business</b>		
	a. Legal Counselling /		
	b. Patent Assistance		
	c. Accounting / Bookkeeping		
	d. Computer & Information		
	e. Venture Capitalist		

After successful validation of all items, questionnaire was developed and demographic data including age, gender, experience, and education. Respondent's status was also added, including the manager, employee, trainer, faculty, incubatee. The questionnaire in its final shape was pre-tested on a smaller number of respondents. Successful completion of test run questionnaire was deployed online using data collection facility (UDQUEST) to collect the data. Respondents were contacted through emails and social media channels including WhatsApp, LinkedIn, Facebook, and Instagram etc. A total of 75 responses were found complete in all respects (N=75) and a sample size of 75 business incubator experts and alumni was believed to be adequate for the current study (Siddiqui,

2013). Data was analysed including descriptive analyses, factor analyses, and cluster analyses using SPSS and MS Excel software.

**Table 4** Critical Success Factor for UBI in Saudi Arabia – Major Dimensions

Serial No.	Dimensions	Number of items	Validated by Experts				
			1	2	3	4	5
1	<b>Access to Funds</b> <ul style="list-style-type: none"> <li>• Average investment attracted</li> <li>• Seed funding attraction</li> <li>• Total attractive investment</li> </ul>	3	√	√	√	√	√
2	<b>Access to Network</b> <ul style="list-style-type: none"> <li>• Number of events conducted</li> <li>• Number of partners</li> </ul>	2	√	√	√	√	√
3	<b>Competence Development</b> <ul style="list-style-type: none"> <li>• Coaching and mentoring hours</li> <li>• Number of services and supports</li> </ul>	2	√	√	√	√	√
4	<b>Economy Enhancement</b> <ul style="list-style-type: none"> <li>• Total revenue for projects</li> <li>• Number of graduates</li> <li>• Number of IPOs</li> <li>• Number of jobs created</li> </ul>	4	√	√	√	√	√
5	<b>Engaged Alumni</b> <ul style="list-style-type: none"> <li>• Alumni engagement per support</li> <li>• Number of attractiveness Program</li> <li>• Number of high growth rate enterprises</li> <li>• Number of sponsorships attracted</li> <li>• Rate of survival project in the first year</li> <li>• Rate of survival projects over five years</li> </ul>	6	√	√	√	√	√
6	<b>Entry Criteria</b> <ul style="list-style-type: none"> <li>• Time limit to tenancy</li> <li>• Affiliated with university</li> <li>• Be able to pay operating expenses</li> <li>• Number of advance technology projects</li> </ul>	4	√	√	√	√	√
7	<b>Incubator Governance</b> <ul style="list-style-type: none"> <li>• Experienced incubator manger</li> <li>• University link</li> </ul>	2	√	√	√	√	√
8	<b>Shared Service</b> <ul style="list-style-type: none"> <li>• Importance of business service</li> <li>• Importance of management assistance</li> <li>• Importance of professional business</li> </ul>	3	√	√	√	√	√
9	<b>Talent retention</b> <ul style="list-style-type: none"> <li>• Continuous improvement for the graduates</li> <li>• Effective start-up for the graduate</li> </ul>	2	√	√	√	√	√
	<b>Total</b>	28	√	√	√	√	√

#### 4. Results and discussion

The data was analysed in three stages; a) descriptive analysis; b) exploratory factor analysis, c) cluster analysis multiple regression was used to investigate the effects of consumer’s personality on the usage patterns of mobile phone services.

Table 5 shows descriptive analysis for UBI’s critical success factors. Result of descriptive analysis shows top three critical factors include (1) competence development: coaching and mentoring hours (M=3.87); (2) access to

funds: total attractive investment (M = 3.84) and (3) competence development: number of services and support (M = 3.81). These findings are true reflection of incubatees looking for mentorship and coaching, access to funds and general services offered by the UBIs. Interestingly these findings belong to different generations of services offered by UBIs for example coaching and mentoring hours and access to funds belong to second generation of UBIs while number of services and support has been classified as part of first-generation criteria. On the other hand, three least important critical factors include (1) entry criteria: affiliated with university (M = 3.25); (2) entry criteria: time limit to tenancy (M = 3.24) and (3) economy enhancement: number of IPOs (M = 3.21).

**Table 5** Critical Success Factor for UBI in Saudi Arabia – Descriptive Analysis [N=75]

Criteria	Level of Critical Importance (1 – Low; 5 – High)						Mean
	1	2	3	4	5	Total	
Competence Development: Coaching and mentoring hours	2	10	2	43	18	75	3.87
Access to Funds: Total attractive investment	6	8		39	22	75	3.84
Competence Development: Number of services and supports	1	16	1	35	22	75	3.81
Incubator Governance: Experienced incubator manger	3	12	3	36	21	75	3.8
Economy Enhancement: Number of jobs created	3	13		41	18	75	3.77
Access to Funds: Average investment attracted	3	12		45	15	75	3.76
Entry Criteria: Number of advance technology projects	5	11	1	40	18	75	3.73
Economy Enhancement, Total revenue for projects	1	15		48	11	75	3.71
Incubator Governance: University link	3	15	1	38	18	75	3.71
Access to Funds: Seed funding attraction	3	16		39	17	75	3.68
Talent retention: Effective start-up for the graduate	2	21		29	23	75	3.67
Engaged Alumni: Number of high growth rate enterprises	4	16		38	17	75	3.64
Economy Enhancement: Number of graduates	5	13		44	13	75	3.63
Shared Service: Importance of business service	3	18		37	17	75	3.63
Shared Service: Importance of professional business	3	17		40	15	75	3.63
Shared Service: Importance of management assistance	7	13		39	16	75	3.59
Talent Retention: Continuous improvement for the graduates	2	22		34	17	75	3.56
Engaged Alumni: Number of attractiveness Program	3	18	2	38	14	75	3.56
Engaged Alumni: Alumni engagement per support	3	20	3	32	17	75	3.53
Access to Network: Number of events conducted	4	20		36	15	75	3.51
Engaged Alumni: Rate of survival project in the first year	3	21		37	14	75	3.51
Engaged Alumni: Number of sponsorships attracted	5	18		39	13	75	3.49
Engaged Alumni: Rate of survival projects over five years	3	23	1	30	18	75	3.49
Access to Network: Number of partners	9	17		28	21	75	3.47
Entry Criteria: Be able to pay operating expenses	4	22		33	16	75	3.47
Entry Criteria: Affiliated with university	11	19		30	15	75	3.25
Entry Criteria: Time limit to tenancy	4	27		35	9	75	3.24
Economy Enhancement: Number of IPOs	10	22		30	13	75	3.19

Table 6 shows exploratory factor analysis (EFA), which can be used to summarize the UBIs critical success factors and ultimately can be used in the performance evaluation of UBIs. EFA was performed using the principal component analysis as extraction method and varimax rotation method with Kaiser normalization, was used to determine the factor structure of 28 items related to UBI critical success factors. Analyses resulted in a five-factor solution, consists of a total of 28 items. These items were analysed using qualifying criteria. The factor loading criteria were applied which required that; (a) a factor must have at least 2 salient item loadings greater than 0.3, (b) individual items must have at least one factor loading greater than 0.3 and (c) any item loading on more than one factor when the final solution is obtained will be placed only in the factor on which it loads most highly. Overall scores were created by summing item scores and creating one dimensional factor score, one for each

factor and dividing by the number of items in that factor, making overall scores relative and comparable. Participant’s potential overall scores on each factor ranged from 1 to 5. The first factor is ‘support services’, which aims to provide all requirements for the incubator until incubatee become self-sufficient and successful in the market. The second factor is the ‘network and communication services’ which mainly measuring the effectiveness business incubator to get involved in the targeted field’s environment and establishing an effective communication with the surrounding market which give the incubator the ability to successfully maintain the supply chain for the project. The third factor is ‘financial support’ which evaluate the ability of the business incubator to provide the required seed fund for the incubatee’s project and the return of investment for the projects. The fourth-critical factor is the ‘economic development’ which relates the contribution of the business incubator’s projects in national economic development in term of job creation and the number of successful projects in the market. The last important factor is the ‘alumni network quality & successfulness, which measure the rate of growth for incubator project in the market.

**Table 6** Critical Success Factor for UBI in Saudi Arabia - Factor Analysis [N=75]

Items	Factors				
	Support Services	Network Support	Financial support	Economic development	Alumni success
Shared Service: Importance of management assistance	.632				
Entry Criteria: Time limit to tenancy	.623				
Entry Criteria: Number of advance technology projects	.608				
Shared Service: Importance of professional business	.600				
Entry Criteria: Affiliated with university	.584				
Engaged Alumni: Rate of survival projects over five years	.570				
Incubator Governance: University link (long run relation with entrepreneur)	.555				
Talent retention: Effective start-up for the graduate and getting accepted	.545				
Economy Enhancement: Number of successful IPOs with proof	.537				
Entry Criteria: Be able to pay operating expenses	.489				
Access to Network: Number of partners (business development)		.752			
Access to Network: Number of events conducted by incubators and involve in.		.707			
Engaged Alumni: Alumni engagement peer support		.677			
Engaged Alumni: Rate of survival project in the first year		.626			
Engaged Alumni: Number of sponsorship attraction by incubators		.523			
Talent Retention: Suitable improvement for the graduate		.514			
Incubator Governance: An experienced incubator manger		.465			
Competence Development: Coaching and mentoring hours			.677		
Economy Enhancement: Total revenue for projects			.638		
Access to Funds: Average investment attracted (funding- average)			.634		
Access to Funds: Total attractive investment			.544		
Economy Enhancement: Number of jobs created by the incubator				.797	
Competence Development: Number of service and support				.581	
Economy Enhancement: Number of graduates of the incubators				.530	
Access to Funds: Seed funding attraction (funding- probability)				.347	
Shared Service: Importance of business service					.721
Engaged Alumni: High growth enterprises rate for post-graduation					.463
Engaged Alumni: Number of attractiveness Program					.431

Table 7 shows two major cluster groups which have been formulated from the samples. The first cluster is the ‘employee’ of the incubator, which has more than ten years in the incubator process. The second group is the

‘incubatee’, which considered as business incubator’s customers and normally spend a short period of time in the business incubator before the graduation. The employee group has chosen for the criticality of most of success factors in the survey. This vote due to the highly experience on the field and the knowledge of business incubator operation and the effective key performances factor which can be used to evaluate the efficiency of business incubator. In other hand, the incubatee group has chosen for neutral for most of the success factors which can be justify be looking to the experience of the incubator in the field. Moreover, the incubatee group does not involve in the day-to-day operation for business incubator. Additionally, both groups have their own interests, the employee group target to produce an effective product “graduato” which success in the market and incubator group looking for a knowledge and the fund to success in the project.

**Table 7** Critical Success Factor for UBI in Saudi Arabia - Cluster Analysis [N=75]

Final Cluster Centres	Clusters		ANOVA					
	Incubatees	Employees	Cluster		Error		F	Sig.
			Sq.	df	Sq.	df		
Status	4	3	4.891	1	0.997	73	4.905	0.03
Access to Network: Number of partners (business development)	2	4	44.379	1	1.429	73	31.064	0.00
Economy Enhancement: Number of successful IPOs with proof	2	4	37.38	1	1.425	73	26.236	0.00
Engaged Alumni: Rate of survival projects over five years	2	4	49.902	1	0.943	73	52.914	0.00
Entry Criteria: Affiliated with university	2	4	56.255	1	1.259	73	44.671	0.00
Entry Criteria: Time limit to tenancy	2	4	23.91	1	1.175	73	20.35	0.00
Shared Service: Importance of professional business	2	4	53.302	1	0.633	73	84.141	0.00
Talent retention: Effective start-up for the graduate and getting accepted	2	4	52.859	1	0.874	73	60.474	0.00
Access to Funds: Total attractive investment	3	4	32.505	1	1.008	73	32.252	0.00
Competence Development: Number of service and support	3	4	20.594	1	0.997	73	20.653	0.00
Economy Enhancement: Number of graduates of the incubators	3	4	20.349	1	1.085	73	18.757	0.00
Engaged Alumni: Alumni engagement peer support	3	4	27.65	1	1.137	73	24.314	0.00
Engaged Alumni: High growth enterprises rate for post-graduation	3	4	18.765	1	1.213	73	15.475	0.00
Engaged Alumni: Number of sponsorship attraction by incubators	3	4	20.502	1	1.236	73	16.585	0.00
Engaged Alumni: Rate of survival project in the first year	3	4	21.181	1	1.172	73	18.071	0.00
Entry Criteria: Be able to pay operating expenses	3	4	21.463	1	1.332	73	16.118	0.00
Entry Criteria: Number of advance technology projects	3	4	23.547	1	1.084	73	21.726	0.00
Incubator Governance: An experienced incubator manger	3	4	22.253	1	1.01	73	22.028	0.00
Incubator Governance: University link (long run relation with entrepreneur)	3	4	24.576	1	1.027	73	23.93	0.00
Shared Service: Importance of management assistance	3	4	22.993	1	1.304	73	17.632	0.00
Talent Retention: Suitable improvement for the graduate	3	4	24.009	1	1.157	73	20.749	0.00
Competence Development: Coaching and mentoring hours	3	4	10.982	1	0.9	73	12.205	0.001

## Conclusions

The project has been set to customize an internal criterion which can be used to evaluate UBI’s performance in Saudi Arabia or elsewhere. Three international standard modules have been explored and customize for Saudi Arabia environment. A target sample has selected by using judgmental sampling technic. The total received response is 200 responses. The results show, most of the response agreed on the criticality of the costumes models. Five main factors have been identifying through the factor analysis, economic support, network & communication, financial support, contribution in economic development and graduator quality & successfulness. Two clusters groups have been identifying from the survey results. This group is incubator group and employee.

Each opinion reflection the interest of each group in term of how this group is looking to the incubator process. The incubator more looking for fund and knowledge to effectively start their project in the market. In the other hand the incubator employee which more knowledgeable about the incubator process and procedure.

Business incubator has been started around ten years back in Saudi Arabia universities. It is recommended to lunch a comprehensive awareness for universities student in order to enhance their knowledge and build up the passion in them to start the bath in the local market. Moreover, most of business incubators are facing a difficulty of getting fund and the government bureaucratic requirements.

This research will generate many tangible outputs serving different stakeholders for example, it will provide baseline data and measuring the performance of UBIs in Saudi Arabia. Similarly this exercise will also be used to enhance other business, technology, and bio-technology incubators in Saudi Arabia. It provides output in the form research paper and /or conference paper and augment the existing literature on the subject area. It generates a critical success factor for UBIs, which will help policymakers enhance their UBI policies and rationalize their budgets for different UBIs having different levels of success criteria. Finally, and probably more exciting and rewarding output from this research is in the form of UBI consulting services to enhance the performance of UBIs in Saudi Arabia or elsewhere.

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