

# Measuring innovation: the use of indicators in developed countries

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## Abstract

**Purpose** – The purpose of this paper is to describe and identify the ranking of innovation program landscape in the UK. The identification will focus on the average of four categories: policy, culture, economy, and industry.

**Design/methodology/approach** – The nature of this research is mainly qualitative. This investigation uses two semi-structured interview based in the UK, combined with an examination of organizational documents.

**Findings** – The research findings indicated highest ranking of the Petchey Center of Entrepreneurship located in University of East London present culture 60 percent, policy 75 percent, industry 80 percent, and economy 100 percent.

**Originality/value** – The authors conclude with several recommendations for academia and practitioners such as governments, policy makers, funded organizations, and strategic institutions.

**Keywords** Innovation, Technology commercialization

**Paper type** Research paper

## Introduction

The Organisation for Economic Cooperation and Development (OECD, 2010) defines innovation as the implementation of a new or significantly improved product, service, or process; a new marketing method, organizational method in business practices, workplace organization, or external relations. There are many researchers who discussed the role of innovation in developed and developing countries (Astrid *et al.*, 2009; Arocena and Sutz, 2000; Cassiolato *et al.*, 2003; Lundvall *et al.*, 2009). Although, innovation is vital to spur economic growth and to raise living standards. Also, economies are becoming more knowledge-based, where innovation is the driver of long-term economic growth. Most of higher research and development (R&D) used innovation, productivity, and per capita income toward to long-term growth (Hall and Jones, 1999; Rouvinen, 2002).

The objectives of this paper is to describe and identify the ranking of innovation program landscape in the UK. The identification will focus on the average of four categories: policy, culture, economy, and industry.

The structure of this paper is as follows: the following provides a literature review of the innovation program. The next section provides the research methodology included the evidence from the literature review and the UK interview of the two innovation program. In the penultimate section, the authors briefly discuss the findings of the study drawn from qualitative analysis of innovation. Final section concludes with implications of innovation in developed countries.

## Literature review of innovation

Al-Mubarak *et al.* (2014a) indicated that the research used qualitative approaches of the innovation program landscape in the UK. The research findings indicated high ratings



for indicators in all four categories of culture, policy, economy, industry, averaging 90, 90, 90, and 100 percent, respectively. In addition, Al-Mubarak *et al.* (2014b) showed the results of qualitative research of St. John's Innovation Center based in UK. Specifically, the categories of policy and industry received ratings of 80 percent, with each of the four indicators in those two categories also receiving ratings of medium. The categories of culture and economy received ratings of 95 percent. For each of those categories, three indicators received ratings of high and one received a rating of medium. None of the indicators received a rating of low. Therefore, the program at St. John's Innovation Center can be described with the highest emphasis on the indicators: creativity, innovation, entrepreneurship, survival rate, jobs creation, and start-up companies. Of secondary importance, but still significant, were the indicators: training program, government role, role of university, strategic focus, incubators funding, incubators type, incubators services, incubators size, new products, and number of patents. Thus, while significant levels of attention are given to the development of policy to support innovation and efforts to track the progress of innovation efforts by means of industry variables, even greater attention is given to the creation of a culture to support innovation and measures of the overall impact of innovation on the economy.

Al-Mubarak and Busler (2009) indicated that innovation centers provide entrepreneurs with expertise, networks, and tools they need to make their ventures successful. The study discussed European models based on their adoption as case study examples: the UK, France, and Germany. They account for 83 percent of all the incubators located throughout Europe today. Although, Al-Mubarak and Busler (2010a) indicated that innovation programs can help young firms to survive and grow during their start-up years, and can play a key role in the economic development of a community or region. Moreover, Al-Mubarak and Busler (2010b) considered innovation centers as cost-effective economic development processes. Innovation could be an effectual driver for economic development at appreciably higher cost than originally anticipated unless a thorough and objective feasibility study is planned, performed, and best-practice is applied.

According to the European Business and Innovation Network (European Business and Innovation Center Network (EBN), 2012) indicates the percentages of the groups of innovation as divided in Europe into three groups: technological innovation 51.49 percent, non-technological innovation 38.34 percent, and non-innovation 10.16 percent. The main focus of business innovation centers (BICs) was to support start-ups firms. In fact, BICs supported 2,491 companies and requested 666 patents for companies and entrepreneurs, resulting in a 307 granted patents.

Several studies used the combination of science, technology and innovation (STI) as indicators and can be contributed positively on the social and economic which business competition is increased based on innovation (Freeman and Soete, 2009; Godin, 2007; Sagasti, 2004). Furthermore, European countries used innovation indicators as methodology, for example, European Innovation Index have been published (European Commission (EC), 2001, 2005, 2006, 2007; OECD, 2005). Finally, Japan used S&T activities includes inputs in R&D, staff, output, and number of scientific paper citations as ranking multiplicity of indicators (Niwa and Tomizawa, 1995, 1996; Kodama, 1987).

### **Research methodology**

Insights from the literature review were combined with analysis of the interviews to measure the performance of each program to provide an in-depth understanding of the research landscape and a rich insight into the research objectives

(Eisenhardt, 1989; Yin, 1994). The international interview design is based on two charts. First, the radar chart consists of four categories: culture; policy; industry; and economy. In addition, each category is measured by four indicators and each indicator is rank-ordered as an independent variable (e.g. low (L), moderate (M), and high (H)) with total of 16 indicators. Second, the average for each category is measured on a scale of 100 percent and the average for each indicator is measured on a scale of 25 percent. There are three groups of outcomes, for example, a total percentage of categories between 80 and 100 percent indicated a high outcome, between 60 and 79 percent indicated medium outcomes, and less than 60 percent indicated low outcomes (see Figure 1).

### Findings and discussions

From the current literature, it is evident (see “Research methodology”) innovation is the driver of our future growth (White House, 2010; EURP, 2010; European Business and Innovation Center Network (EBN), 2010; EC, 2010; Eshun, 2009). This requires improving the quality of our education, strengthening our research performance, promoting innovation and knowledge transfer, making full use of information and communication technologies, and ensuring that innovative ideas can turn into new products and services that create growth, quality jobs, and help address global societal challenges. However, to succeed, this must be combined with entrepreneurship, finance, and a focus on user needs and market opportunities (EC, 2010).

Furthermore, innovation-based incubators are local economic development tools (EURP, 2010; Al-Mubarak and Busler, 2009, 2010a; Eshun, 2009; Al-Mubarak *et al.*, 2014), which innovation-based incubators support innovative business projects,

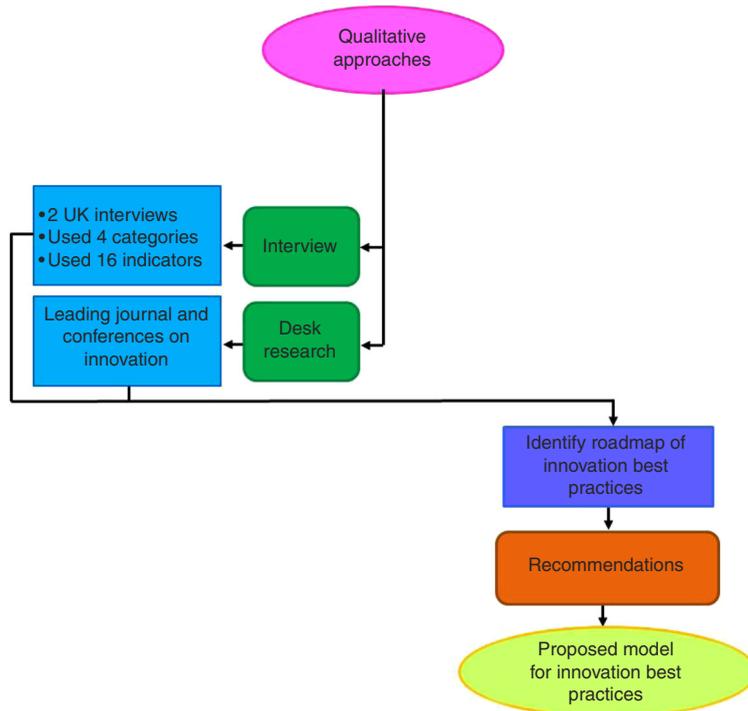


Figure 1.  
Research  
methodology

which could be either technologically or non-technologically oriented (EC, 2010). Incubators provide new high-tech venture creation, technological entrepreneurship, commercialization, and transfer of technology (Mian, 1994, 1997; Phillips, 2002; McAdam and McAdam, 2008; Al-Mubaraki, 2008; Al-Mubaraki and Busler, 2011a,b,c; Al-Mubaraki *et al.*, 2014).

*Interview 1: The Petchey Center of Entrepreneurship, University of East London, UK*

Figure 2 shows the ratings for The Petchey Center of Entrepreneurship, University of East London. Two of the four categories – culture and policy – received high ratings, and the other two – industry and economy – received medium ratings. Only three indicators received low ratings – incubator funding, number of patents, and new products.

Similarly, Table I presents the average of indicators as the result from the radar chart, at 78 percent, which indicated an average outcome in the medium range. The percentage of each category from the radar chart indicated ratings for culture, policy, industry, and economy of 85, 85, 70, and 70 percent, respectively (see Figure 3).

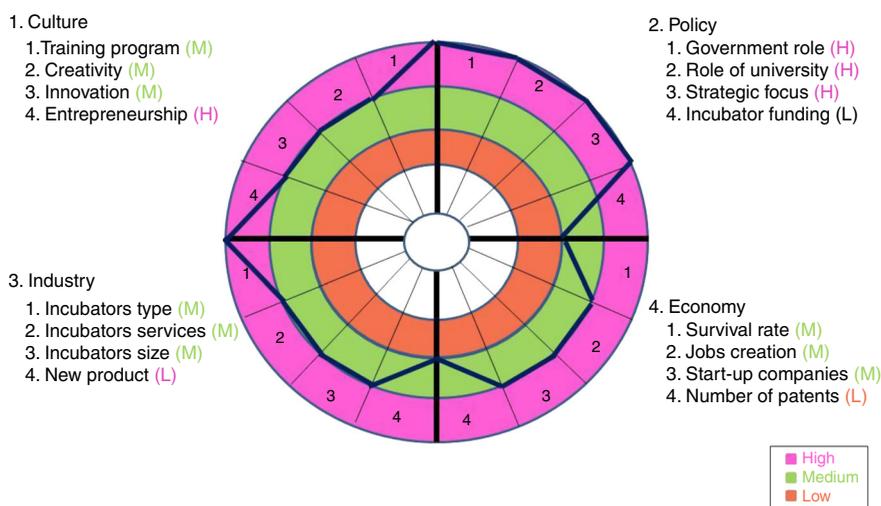
*Interview 2: University of Birmingham, UK*

Figure 4 shows the ratings for the University of Birmingham, UK. Two categories, industry and economy, received high ratings, the category of policy received a medium rating, and the category of culture received a low rating. Three key performance indicators received low ratings – entrepreneurship, strategic focus, and creativity.

Table II presents the ratings as the result from the radar chart, with an average of 79 percent, which indicated an average outcome in the medium range. The economy category received a rating of 100 percent. However, the policy, culture, and industry categories received ratings of 75, 60, and 80 percent, respectively (see Figure 5).

*Summary of interviews*

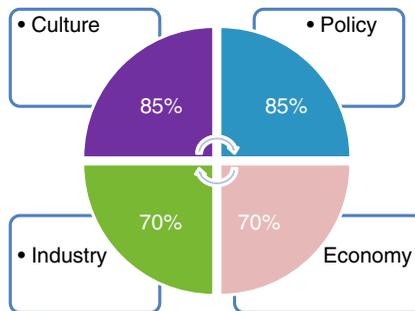
Table III presents the interview ranking of two selected innovation centers. The Birmingham University, UK presents the highest rank with an average of 79 percent. However, The Petchey Center of Entrepreneurship, University of East London, indicated second ranking.



**Figure 2.** Radar chart of The Petchey Center of Entrepreneurship, University of East London

**Table I.**  
Result of average indicators of The Petchey Center of Entrepreneurship, University of East London

	100 (%)	High (25%)	Scale Medium (20%)	Low (10%)	Indicators (%)	Total categories (%)
<i>Culture</i>	100					
Training program	25		20		20	85
Creativity	25		20		20	
Innovation	25		20		20	
Entrepreneurship	25	25			25	
<i>Policy</i>	100					
Government role	25	25			25	85
Role of university	25	25			25	
Strategic focus	25	25			25	
Incubator funding	25			10	10	
<i>Industry</i>	100					
Incubators type	25		20		20	70
Incubators services	25		20		20	
Incubators size	25		20		20	
New product	25			10	10	
<i>Economy</i>	100					
Survival rate	25		20		20	70
Jobs creation	25		20		20	
Startup companies	25		20		20	
Number of patents	25			10	10	
Total	400					310
Average (%)	100					77.5

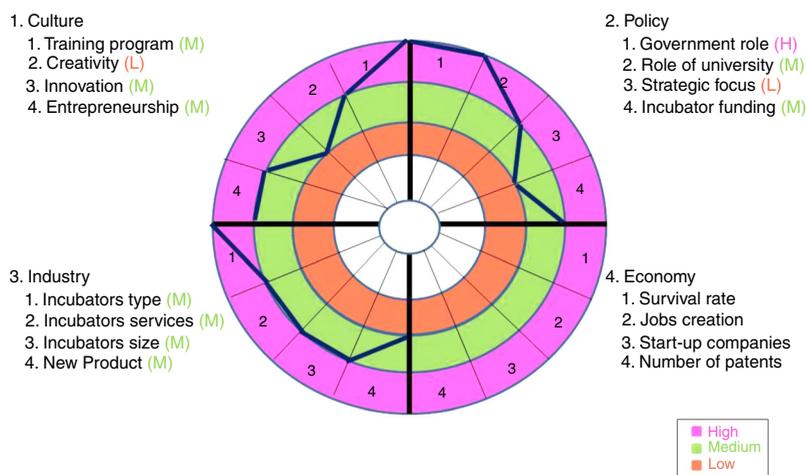


**Figure 3.**  
Percentage of total outcomes from radar chart

### Conclusions and reflection

Based on the analysis of the interviews we have identified many areas of opportunity for enhancing the work of innovation centers and business incubators in developed countries. Following are the recommendations:

- (1) construct an innovation data bank for best practice models including successful case studies and outcomes to share the knowledge worldwide;
- (2) construct a worldwide database of innovation to upload annual reports with data for each country to facilitate networking and exchange of information;

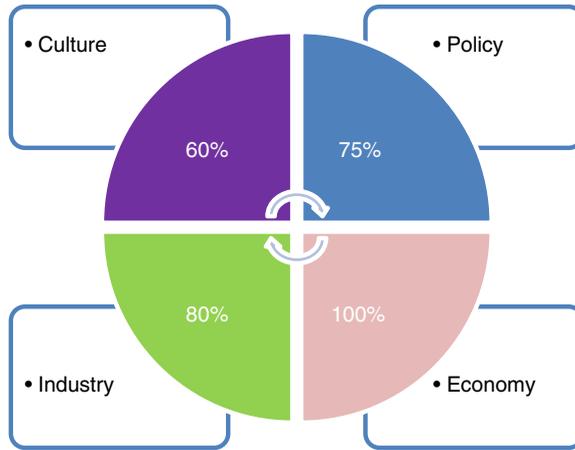


**Figure 4.**  
 Radar chart of  
 University of  
 Birmingham, UK

	100 (%)	High (25%)	Scale Medium (20%)	Low (10%)	Indicators (%)	Total categories (%)
<i>Culture</i>	100					
Training program	25		20		20	60
Creativity	25			10	10	
Innovation	25		20		20	
Entrepreneurship	25			10	10	
<i>Policy</i>	100					
Government role	25	25			25	75
Role of university	25		20		20	
Strategic focus	25			10	10	
Incubator funding	25		20		20	
<i>Industry</i>	100					
Incubators type	25		20		20	80
Incubators services	25		20		20	
Incubators size	25		20		20	
New product	25		20		20	
<i>Economy</i>	100					
Survival rate	25	25				100
Jobs creation	25	25				
Startup companies	25	25				
Number of patents	25	25				
Total	400					215
Average (%)	100					79

**Table II.**  
 Result of average  
 indicators of  
 University  
 of Birmingham, UK

- (3) promote innovation as a tool to strengthen the modern economy based on the knowledge toward smart growth;
- (4) provide incubator models with outcomes on innovation, entrepreneurship, and job creation;



**Figure 5.**  
Percentage of total  
outcomes from  
radar chart

Interview	Culture (%)	Policy (%)	Industry (%)	Economy (%)	Average (%)	Scale <sup>a</sup>	Rank
Birmingham University, UK	60	75	80	100	79	Medium	1
The Petchey Center of Entrepreneurship, University of East London, UK	85	85	70	70	78	Medium	2

**Notes:** <sup>a</sup>Scale high ranged 81-100 percent; scale medium ranged 41-80 percent; scale low ranged less than 41 percent

**Table III.**  
Summary  
of interviews

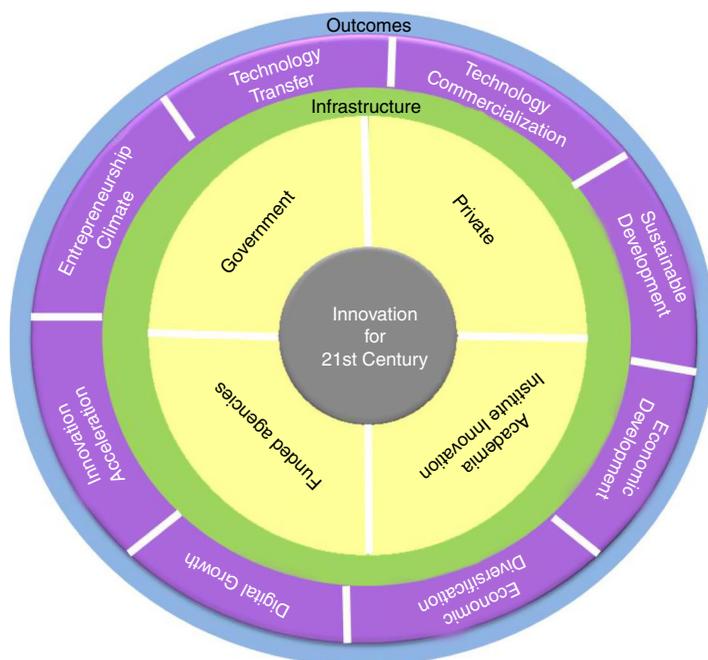
- (5) innovation centers and incubation programs should evaluate their results annually and analyze their strengths, weaknesses, opportunities, and threats for continuing planning and improvement; and
- (6) focus on entrepreneurship as the most important element in generating innovation and economic growth including new firms, job growth, and small businesses.

In conclusion, innovation programs are vital tools for economic growth, knowledge, and technology transfer based on the several indicators such as creativity, entrepreneurship, survival rate, job creation, start-up companies, and number of patents. Future work can be continued from other regions such as the Middle East and South America which will fetch positive lessons that are valuable for future expansion and development of science park or innovation center.

Finally, Figure 6 presents model of innovation strategy for twenty-first century with innovation infrastructure and innovation outcome, which contributed positively in developed and developing countries.

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**Figure 6.**  
The proposed model

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