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Berna Beyhan
Science and Technology Policy Studies PhD student, Middle East Technical University, Ankara, Turkey

Elif Dayar
Science and Technology Policy Studies PhD student, Middle East Technical University, Ankara, Turkey

Derya Fındık
Science and Technology Policy Studies PhD student, Middle East Technical University, Ankara, Turkey

Sinan Tandoğan
Scientific and Technological Research Council of Turkey (TUBITAK)

TEKPOL | Science and Technology Policies Research Center
Middle East Technical University
Ankara 06531 Turkey
http://stps.metu.edu.tr

Comments and critics on the discrepancies between the Oslo Manual and the Community Innovation Surveys in developed and developing countries

Berna Beyhan [1], Elif Dayar [2], Derya Fındık [3], Sinan Tandoğan[4 +]

[1] Science and Technology Policy Studies PhD student, Middle East Technical University

[2] Science and Technology Policy Studies PhD student, Middle East Technical University and instructor at Atılım University, Business Administration Department

[3] Science and Technology Policy Studies PhD student, Middle East Technical University

[4] Scientific and Technological Research Council of Turkey (TUBITAK)

Abstract.
This study aims to investigate how successful Community Innovation Survey (CIS) is in reflecting main concerns of measuring innovation stated in the Oslo Manual. Although this survey has been widely applied throughout the European countries since 1992, the discussions over its suitability as a reliable tool to measure innovation along different cultures of innovativeness still remain. Motivated by the arguments on the reliability of CIS as a tool to measure innovation and its conformity to the guidelines of the Oslo Manual, this paper reviews and discusses these arguments in a broader context and presents the implications of possible problems that arise due to these discrepancies in the case of a developing country, namely, Turkey.

Keywords: Innovation measurement, Oslo Manual, Community Innovation Survey

[+] Corresponding author. Tel: +90-312-4685300 ; Fax: +90-312-4275769
E-mail Address: sinan.tandogan@tubitak.gov.tr
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1. Introduction

Measurement of innovation and the comparability of innovativeness among different industries and countries are among the key issues for innovation- related policy implications. Therefore, the presence of a reliable guideline for the determination of widely applicable innovation indicators and a reliable tool for the measurement of these indicators are crucial. For about two decades, these issues have been overcome through the development of the Oslo Manual and Community Innovation Survey (CIS) which was developed in accord with the Oslo Manual.

Although CIS has been applied to the European countries since 1992 and has been modified so as to cover innovation in services industries and also non-technological innovations, i.e. organizational and marketing innovations, the discussions over the suitability of CIS as a reliable tool to measure innovation along different cultures of innovativeness and under various economic and industrial conditions and structures still remain.

Motivated by these arguments on the reliability of CIS as a tool to measure innovation and its conformity to the guidelines of the Oslo Manual this paper aims to review and discuss these arguments in a broader context and present the implications of possible problems that arise due to the aforementioned discrepancies in the case of a developing country, namely, Turkey.

2. A general review of the history of measuring innovation and critics to CIS

From 1930s to nearly the 1990s a certain amount of effort had been spent to measure R&D activities since the linear conceptualization of innovation and technological change was based on the belief that R&D eventually brought the innovation. However, the rise of evolutionary and nonlinear conception of innovation in the last three decades had widely changed the premises of measuring technological change. It was an OECD effort to generate the Oslo Manual summarizing the new theories regarding innovation and making its worldwide application possible for the measurement of innovation (Carvalho, 2006). Thus, a more direct measurement of innovation was made possible (Tether, 2001) and, as mentioned by Godin (2002), through the Oslo Manual and consequential surveys, there occurred a conceptual shift from measuring the outputs of innovation in the 1970s to measuring activities facilitating innovation directly.

As mentioned in the Oslo Manual (2005, p.3), during the 1980s and the 1990s a considerable effort was undertaken to develop a framework to study the concept of innovation; thus the first version of the Oslo Manual was launched in 1992. This version was mainly focused on technological product and process (TPP) innovations in the manufacturing sectors. It also provided a guideline for large scale surveys (European Community Innovation Surveys) examining the factors affecting innovation and their impacts. Results from these surveys had brought about refinements in the framework and a second edition was published in 1997. Among others, the most important point about this new version was the expansion of coverage to services sectors. However, due to the problems regarding the measurement of innovation in services sectors which could not be adequately captured by the TPP concept, a third version of the manual aiming to address the question of non-technological innovation was publicized in 2005. Marketing and organizational innovation types and a systemic approach to innovation were features introduced in this version.

Although this last edition aimed to capture the dynamic, evolutionary and non-technological dimensions of innovation for both the developed and the developing world, the Community Innovation Surveys (CIS) that were developed in the light of the Oslo Manual failed to follow these essential guidelines in the measurement of innovation. Inspecting the CIS in the guidance of the Oslo Manual, this section aims to present the main discrepancies between the two; and review the critics to the application of the Oslo Manual but specifically to Community Innovation Surveys.

The first experiments of innovation surveys guided by propositions of the Oslo Manual took place in the European countries. The European Community (now European Union) and EUROSTAT delivered a standard questionnaire, which is now on its fourth version. EUROSTAT, in collaboration with the OECD, has determined a core list of questions that permit comparable innovation surveys in Europe. The first Community Innovation Survey (CIS) using a common questionnaire was launched in 1991 and was carried out in 1992. A second version was started in 1997 and completed in 1999, and the third and fourth were launched in 2001 and 2006 respectively. In Turkey, innovation surveys were carried out by using these standard questionnaires with minor changes. In the following part the results derived from the review of literature which criticizes innovation surveys and displays the discrepancies between the Oslo Manual and CIS will be presented. The main critics to these innovation surveys focus on (i) the innovation concept which is generally used in a very narrow sense; (ii) the limitation of the innovation concept with the TPP innovation; (iii) the differences between sectors (especially services and manufacturing); (iv) the poor investigation of relations, linkages between agents, in other words, network effects on innovation; (v) the omission of unsuccessful cases; and (vi) the measurement of innovation in developing countries.

2. A general review of the history of measuring innovation and critics to CIS

2.1. Critics related to the concept of innovation

The Oslo Manual considers innovation in a broad sense as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (Oslo Manual, p.46). However its application in the CIS has generated criticisms since it takes innovation in a narrower sense which may cause a problem in the generation of indicators (Carvalho, 2006). The main reasons creating such a problem are that (i) innovation is a hardly measurable component and (ii) it is a consequence of different activities which are difficult to summarize (Arundel et al, 1998).

On the other hand, it can be argued that innovation surveys are more concerned about the measurement of inputs and outputs within a particular firm but they are not concerned about the actual process (or what is going on in the black box) or dynamics that create the innovation. Although the Oslo Manual refers to the systems of innovation approach, the CIS questionnaire falls short of complying with this approach; and therefore presents a feeble tool to collect information about the dynamics and the actual process of innovation (Salazar and Holbrook, 2003).

Another problem regarding the innovation concept as it is used in CIS is related to the subjectivity of this concept. Although the aim of the CIS is to provide comparable information (between countries and sectors) there are doubts about whether the findings are truly comparable. Since firms are asked whether they are innovative or not, the number of innovators in a country or sector is determined by what is understood as 'innovative' in that country or sector (Tether, 2001). A change that may not be reported as innovation in a dynamic sector where change is routine may be considered as innovation in a comparatively static sector. Moreover, Tether warns that innovation is introduced to the general language as something that is universally accepted as good. On the other hand, it can be considered that this is not a problem merely related to CIS but also to the Oslo Manual or other innovation studies. However, as a survey which is proposed as a tool for measuring innovation and providing comparable innovation data CIS should be revised as using more neutral language or as considering cross cultural or cross-sectoral differences.

2.2. Critics related to the limitation of innovation with technological product and process innovations

CIS questionnaire is concentrated on technological innovation. Even though the third version of the Oslo Manual (2005) includes non-technological innovations such as organizational and marketing types, the innovation surveys are focused mainly on technological innovations. Non-technological innovation is inquired in few questions and detailed information on these types of innovation is not collected. However, as

argued by Lugones and Peirano (2004) non-technological innovation is largely relevant for firm performance and thus deserves to be paid the same attention as its technological counterpart. Moreover, Tether (2001) argues that "more tragically both Oslo Manual and the CIS are confused about what they mean by technological innovation and whether the mere introduction of a technologically new product, process or service is sufficient to qualify a firm as an innovator".

The concept of innovation in the CIS questionnaire is not only limited by technological innovation but also by product and process innovations. Carvalho (2006) argues that this narrow definition of innovation is due to a Schumpeterian approach to innovation, where only the radical innovative attempts are taken into account. Such an approach might be problematic for some sectors where radical innovations rarely occur i.e. services sectors and for firms of developing countries which generally are not capable of carrying out radical technological transformations but imitate new technologies with small improvements. This approach overemphasizes the role of radical technical change and thus devaluates the importance of learning. Thus in this manner it is not only in conflict with the current studies which value the systemic and evolutionary nature of innovation but also creates some unintended problems for the measurement of innovation in a certain amount of sectors and developing countries.

2.3. Critics related to the sektörel differences especially differences between services and manufacturing

The first edition of the Oslo Manual (1992) and the first version of CIS (1992) were designed particularly for the manufacturing sector. The services sector was included in the revised Oslo Manual launched in 1997 and the following surveys. However, this revised version of the manual and surveys were widely criticized because their understanding of innovation in services stems from the studies of the manufacturing sector from the product versus process views (Tether, 2001). This approach, which is based on the understanding of innovation in services with the theories of innovation developed for the manufacturing is called the "assimilation" approach. It uses concepts such as research and development (R&D) investment or information and communication technology (ICT) expenditure in the measurement of innovation in services. Therefore, the assimilation approach tends to lead to the deduction that most services are "supply driven or are latecomers of the innovation process" (Gallouj, 2002).

Despite the efforts in CIS III (2003), to make it more appropriate for the services sectors (Salazar and Holbrook, 2003); the terminology remained biased towards technological innovation, and organizational innovation which are highly significant in the comprehension of innovation in services (Djellal & Gallouj, 1999). Moreover, Salazar and Holbrook (2003) argued that as services are consumed at the point of production, the applicability of product and process innovation for services is rather questionable. Furthermore organizational innovation is a rather important component of services because organizational innovation is what constitutes the main source of competency in services (Gallouj, 2002).

Another point of concern regarding the services and manufacturing sectors is that the boundaries between services and manufacturing have been disappearing (Salazar and Holbrook, 2003). Today, even manufacturing firms need to provide services or improve their services component to survive the ruthless competition in the market. However, the CIS questionnaire cannot capture this new but important feature of the manufacturing firms.

Hence, the problems presented by CIS regarding the measurement of innovation in services sector have long been discussed and tried to be solved in the newer versions of questionnaires since most of the European economies are at the same time large services economies. Moreover all these discussions have recently been extended with some theoretical ramifications; while some groups of researchers emphasize the differences or similarities / dependencies among innovations in service and manufacturing sectors a newly proposed "synthesis approach" (Miles and Boden, 2000) argues that studies on services innovations are capable of broadening our understanding of innovation which are currently shaped by the traditional focus on manufacturing innovations. Finally, the implication of the slight emphasis of CIS over the differences of

innovations in services and manufacturing brings about the underestimation of the innovativeness of services sectors and insufficient investigation of the factors facilitating these types of innovations. This problem hampers the process of measuring innovation and its facilitators in economies mostly reliant on the services sector. This is particularly the case for Turkey, whose income from the services sector constitutes more than half of its GDP.

2.4. Critics related to the problems of measuring innovation in developing countries

The economic structure of developing and underdeveloped countries are thought as different from the developed ones and these structural differences are also considered by some scholars when measuring the science and technology indicators in developing countries. Moreover some developing countries themselves insist on the special characteristics of their economies and need special indicators to measure their innovativeness. When the main specificities of developing countries' innovative environments are considered it can be realized that a special focus on innovation capabilities accumulated by firms and agents are needed; innovation activities should be understood in a broader sense and the role of organizational innovations which is essential for the absorption of new technologies must be taken into consideration (Carvalho, 2006).

After the launching of the innovation surveys in the developed world, the developing countries followed course and in the light of the Oslo Manual, they came up with their own surveys. However seeing the results of the first few surveys, these countries felt the need to adapt their surveys to the context of their developing world (INTECH, 2004). Thus the Bogota manual was launched as an attempt to overcome the limitations of the Oslo Manual. The major differences of the Bogotá Manual from the Oslo Manual can be listed in the form of a broader definition of innovation, which includes not only R&D efforts, but also efforts regarding "design, installation of new machinery, industrial engineering, acquisition of embodied and disembodied technology, organizational modernization and marketing" (Carvalho, 2006).

Another point which should be considered in measuring innovation in developing countries is the important role played by the multinational corporations (MNCs). Carvalho (2006) cites Costa, (2005) and Unesco Institute of Statistics- UIS (2002) suggesting that innovation surveys in the developing countries should have some questions regarding the activities of MNCs and their relationships with other agents. This is believed to add to the knowledge base as to how these countries can benefit more from their activities in their countries.

The consideration of high technology sectors as where innovation takes places is another problematic issue in measuring innovation in developing countries. Salazar and Holbrook (2003) indicate that innovation surveys assume that innovation takes place more in high-tech industries and less in low tech industry. However, in developing countries which are more dependent on resource based low technology sectors, a broader innovation concept should be used in order to take the innovations carried out in low technology sectors into account. Even though the Oslo Manual considers innovation in a broad sense, in the CIS it is limited with the product and process innovations. Hence, for the aim of measuring innovation in developing countries innovation concept should be used in a broader sense than it is used in developed countries.

However sometimes using a broader sense of innovation is not enough. The survey respondents also need to be trained about the definition of innovation. Tsipouri (2007) asserts that no matter how innovation is defined in the manuals of the surveys, what affects the output of the innovation surveys is the interviewees' perception of innovation. Thus more reliable survey results could be retrieved by training the target audience potential innovators and potential interviewees on the meaning of innovation.

Moreover, the intellectual capabilities of firms in developing countries are vital for the initiation of innovation, and yet difficult to gauge. To measure such capacity Lugano and Peirano (2004) and Carvalho (2006) suggest the use of ICT frequency. Even though this same concept and indicator is mentioned in the Oslo Manual, a question regarding this factor is not included in CIS.

In order to tackle the suitability of CIS to the case of Turkey, the following analysis which compares the Turkish CIS to the standards of the Oslo manual, and pinpoints the areas where it falls short of the manual is presented.

3. Analysis of Turkish CIS as per the Oslo Manual

This section lists the discrepancies detected between the Oslo manual (2005) and the CIS applied in Turkey in 2004-2006.

3.1. Types of innovation and innovators

For the purpose of innovation assessment, the Oslo Manual (2005:108), underlines the coverage of four different types of innovation, namely product, process, organizational and marketing. However while covering the product and process innovations in detail, the survey has a rather limited section on the organizational and marketing innovations. The lack of detailed inquiry on organizational and marketing innovations hinders data collection on nontechnological innovations.(Lugones and Peirano , 2004)

Furthermore, the actors of innovation activities need to be investigated considering the effects of externalities, firm potentials and market failure. During the period of CIS introducing a novelty into the market makes the firm "innovative". If a novelty exists but did not reach to the market yet, the subject is called "an innovating firm". Besides those firms, a firm could carry out some activities which have not been turned to innovation in the period of measurement. Such a firm may be called a "potentially innovative" that should be focused in CIS in developing countries. Hence the term potentially innovative should be introduced into the questionnaire for the detection of this kind of firms.

3.2. Innovation activities

The Manual lists the use of ICTs as an essential item to be covered by the survey. For the medium income developing countries, inquiry specifically on back office activities that support core processes and yet are invisible to the third parties is strongly advised by the manual.(Oslo Manual 2005:143). In case such data can not be collected, the manual recommends further inquiry on the acquisition of hardware and software separately both from each other and from machinery and equipment. However the question in the survey, neither lists hardware and software purchases separately from one another nor generates a separate question that can allow for its distinguishment from the machinery and equipment acquisition. (Oslo Manual 2005:144).

One more point that deserves attention is the listing of the machinery equipment, hardware purchases at the historical cost. The Oslo manual underlines this to secure comparability between different enterprises applying different depreciation schedules. However, in the survey, a note of caution is missing. Thus, figures collected from different firms may not be comparable as some may include depreciation and others may not.

Among other specific innovation activities that is listed as essential to be collected are "Industrial design" and "Engineering activities" .While these activities are also recommended to be collected separately from the category of "other product and process development", the survey fails to conform to the suggested guidelines. "Lease or rental of machinery, equipment and other capital goods", "In-house software system development" and "Reverse engineering" constitute the rest of the activities that the Oslo Manual recommends as essential for developing country surveys. (Oslo Manual 2005:144).However, questions regarding these activities are again absent from the survey.

Sources of funds that are used in the acquisition of essential items such as ICTs, hardware, software, or machinery and equipment are advised by the Oslo Manual as quite important. The Manual lists a number of subcategories to be included in the survey, yet the following categories are not presented in the survey: (i) firms' own funds; (ii) funds from related companies (subsidiary or associated companies); (iii) funds from

other (non-financial) enterprises; and (iv) funds from financial companies (bank loans, venture capital, etc.)
The absence of such detailed listing of probable sources of funds hinders collection of information on funds especially for SMEs as SMEs are more dependent on external funds due to insufficient internal funds. Considering that SMEs constitute 99.89 % of the total enterprise population in Turkey, a detailed listing of sources of funds could alleviate the difficulty in collecting accurate data on this matter. (SIS 2002)

3.3. Innovation linkages

The Oslo Manual (2005) pays attention to firm links and puts emphasis on measuring the presence, strength, types and objectives of these linkages. "Inclusion of questions on the geographical location of linkages" is particularly listed in the Oslo Manual in order to address the significance of geographical proximity in the assessment of innovation. (Oslo Manual 2005:144) However, the survey does not have a question on this matter. It is rather important for firms to be able to reach to knowledge sources they find necessary for innovation, however in most parts of Turkey, particularly in rural areas it is rather difficult for firms to access leading knowledge. Thus regional environment is quite significant for firms in Turkey. The absence of questions in the survey on geographical location of linkages hampers the evaluation of this rather vital information.

Another item that the Oslo manual favors and the survey disregards is the duration of relationships between enterprises. The absence of such a question hinders the evaluation of trust, a vital element of an innovation-pro environment.

In addition to these in line with the Oslo Manual's recommendations firm size, firm type and type of collaboration between firms could also be added to the survey as this information brings forth various aspects of collaborators in "learning by interaction" during innovation.

Moreover, in the Oslo manual it is recommended to investigate the users of innovation as indicators of demand structure, yet, there is no question in the survey regarding the users of innovation.

In the survey, there are only two questions regarding the linkages for innovation. The first one asks for the type of parties a firm is in collaboration with and their continent of origin and the other asks for the indication of the most important party the firm has been collaborating with for innovation. This question does not allow for differentiation between different linkage formations for each specific type of innovation, namely, product, process, organizational and marketing. Yet, as network type of relations in product and process innovations are rather different than those deemed necessary for organizational and marketing innovations, basically this question presents a problematic innovation assessment tool in the survey.
As the Oslo manual also indicates (Oslo Manual 2005:39), small and medium sized enterprises are more involved with specialized activities, thus their interaction with other enterprises and other public or private institutions is a significant matter to trace their innovative efforts. For Turkey, where more than half of the GDP stems from SMEs, correct detection of inter-SME or SME-third party linkages is essential for a reliable snapshot of innovation activities.

3.4. Impacts of innovation

The Oslo Manual recognizes the frequency of introduction of product innovations as important to indicate the length of product life cycles. While for products with short life cycles, frequent innovations is normal, those with long life cycles should be paid due attention even if their frequency of innovation is low. Product life cycle information is collected to weight the importance of product innovations. However there is no question on this item in the survey. (Oslo Manual 2005:110)

In order to measure the impact of process innovation the Oslo Manual proposes a question on the estimate of the portion of turnover that is due to process innovation, yet this question is missing from the survey. Thus in terms of magnitude one can not tell how important process innovation is for the enterprise. (Oslo Manual

2005:110) Since process innovation is particularly essential in the services sector, which constitutes about 50% of the GDP in Turkey, the exclusion of this question in the survey seriously hampers the measurement of innovation (see Figure 1).

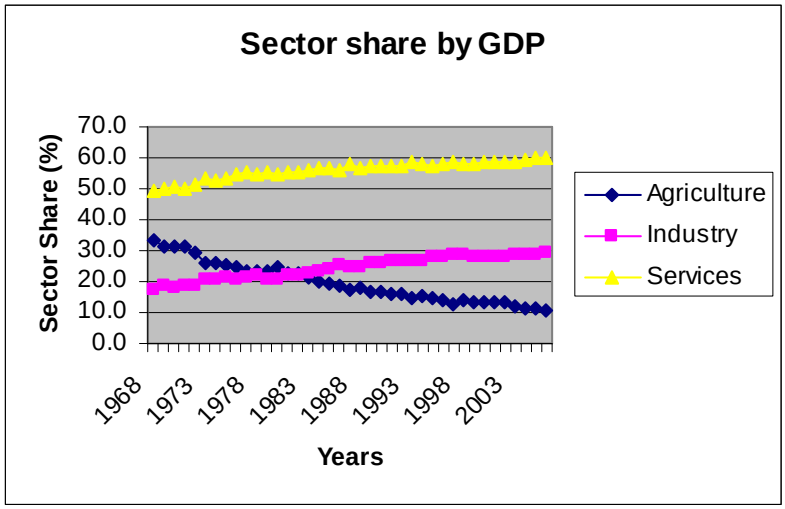

Figure 1. Sector share by GDP in Turkey
Source: State Institute of Statistics

As for assessing the impact of marketing innovation, the manual suggests two questions. One on the share of turnover that is due to improvement in product design and packaging and another on percentage of turnover that is attributable to new marketing methods in pricing, promotion or placement. (Oslo Manual 2005:110,111). Even though the survey does cover these two questions, their being asked in a yes/no format does not allow one to quantify their magnitudes.

3.5. Appropriability methods

The manual suggests use of a separate question on each type of innovation as far as appropriability is concerned (Oslo Manual 2005:115). However, the survey does not differentiate between the types of innovation. As opposed to the Manual, the survey does not include an ordinal scale that can be used to rank the different appropriability methods that are used.

In conformance with the Oslo Manual, the survey has a question covering the different methods of appropriability: patents, registration of design, trademarks, and copyrights. However, the survey does not list the "confidentiality agreements and trade secrecy", "secrecy that is not covered by legal agreements", and "lead time advantage over competitors" methods recommended by the Manual.

For Turkey, the exclusion of these items may seriously hinder the information collected on the means of appropriability. Given the fact that 99.89 % of the Turkish enterprises are made up of small medium sized enterprises, the costs of patent application could prove to be too high for most to incur. Thus they may rely on other methods listed in the manual.

3.6. Obstacles to innovation

While the Oslo manual clearly states that barriers to innovation should be asked for all different types of innovation or a specific subset such as product or process innovations, the questionnaire does not state which innovation types are addressed by the questions in the survey. Furthermore the Oslo manual lists five main categories of factors hampering innovation namely, cost, knowledge, market, institutional, and other factors. However the survey includes only four of these and leaves out the institutional category all together. Since the institutional factors hampering innovation include highly significant issues such as the lack of infrastructure, poor IPR, regulations, standards and taxing, the exclusion of this category seriously hinders the viability of the

survey for Turkey, where these factors are of utmost importance.
As studying obstacles to innovation is the starting point for policy makers to promote innovation, this section deserves extra attention for Turkey, currently deemed as a poor innovator by the European Innovation Scoreboard study.

4. Conclusion and further studies

Innovation is a concept difficult to measure; it presents a broader view of economic development than mere use of patents and R&D expenditures. With its four different types, innovation encompasses a quantitative and a qualitative improvement in product, process, marketing and organizational change. The aim of the Oslo Manual is to provide the guidelines in the making of innovation surveys that aim to take a snapshot of these different types of innovation for both the developed and developing countries. Since its first version in 1992, the concept of innovation has developed and grown into one that includes the services sector as well as the manufacturing, the non-technological activities besides the technological ones and the organizational and marketing innovation in addition to the product and process innovation. Finally in 2005, the addition of a separate annex section to the third version enabled the coverage of the issues related to the measurement of innovation in developing countries.

In the CIS 2006 applied by TUIK (Turkish Statistical Institute) one of the major discrepancies with the guidelines of the Oslo Manual is the insufficiency of the coverage of the marketing and organizational innovation sections. The absence of questions regarding networking among firms, duration of relationship, proximity, trust, developers and users of innovation are other significant deficiencies. The sections on the obstacles to innovation need elaboration in order to reveal the reasons for the poor innovation performance of the business sector.

In our opinion, any tool for measuring innovation in developing countries should consider the peculiarities of these countries. Therefore the measurement of innovation in developing countries should focus not only on “innovative” or “innovating” firms, but potentially innovative ones as well. Building up a new tool or elaborating the existing one for measuring innovation in developing countries which is focusing the potential of firms to succeed needs further investigation of the subject from a different perspective which is beyond the scope of this paper.

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