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Business innovation statistics and the evolution of the Oslo Manual

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ABSTRACT

After the publication of the fourth (2018) edition of the Oslo Manual, a key methodological reference for producing innovation statistics at international level, a review of the definitions of innovation – or, better, business innovation – used by the community of official statisticians has to be recommended. The main reason for such a review is the need to assess to what extent the current Oslo Manual has benefited from the rich economic and management literature on firms' innovation produced since the publication of the previous edition in 2005. It should also be pointed out that the current Manual was expected to fix some long-standing issues like that of properly accommodating service innovation in a statistical framework constantly biased towards innovation in tangible goods and technology-related phenomena. This article argues that these challenges have been only partially met. By reviving some concepts used in the past, such as the object-oriented approach to measure innovation, and being especially concerned to make the statistical framework designed to measure business innovation applicable in other sectors of the economy (including individuals and households), some specific features of the business innovation processes may have been neglected. The Manual discusses a wide array of issues regarding the economics of innovation and management practices, however it does not define a new consistent framework able to accommodate the demand for indicators about the influence on business innovation of the ongoing processes of digitalization, servitization or open innovation and, at least partially, to adopt a service-dominant logic.

Keywords: Innovation statistics; business innovation; service innovation; value co-creation.

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¹ Views and information set out in this article are those of the author and do not necessarily reflect the official opinion of ISTAT.

INTRODUCTION

In October 2018, forty-two months after the launching of the revision process², a new edition – the fourth – of the *Guidelines for collecting, reporting and using data on innovation*, better known as the Oslo Manual³ (OM), was published by the OECD. It replaces the 2005 edition of the Manual and raises great expectations as it displays two key features.

On the one hand, it comes thirteen years after the previous edition. The interval between the second and the third edition was of eight years while only five years had elapsed between the first and the second edition. In a rapidly evolving context of digitalization and globalization, it seems that innovation statistics are becoming less reactive to external inputs. If the next edition of the OM were to come out thirteen years from now, we should expect the current edition to accompany the measurement efforts of innovation statisticians' well into the third decade of this century. In this scenario, the OM 2018 should prove to have been a wise forward-looking exercise.

On the other hand, the OM, which was designed as a short technical manual back in 1992, has seen its size progressively increasing (+40% of words/characters in the 2005 edition compared to the 1997 edition and +100% in the 2018 edition compared to 2005). Rather than just a collection of technical guidelines for statisticians, it now appears to combine in an original way the traits of a statistical manual with those of a treaty on a general theory of innovation.

Although larger and with a broader scope than in the past, the OM 2018 is not expected to trigger dramatic changes neither in the procedures used for data collection,

² In April 2015, the OECD's Working Group dealing with innovation statistics – that of the National Experts of Science and Technology Indicators (NESTI) – gave a start to the process of revising the 2005 Oslo Manual. Official meetings, scientific conferences and workshops, policy papers, journals' articles and surveys have contributed to feed with general ideas and specific proposal the OM revision process that has been managed by an OECD-led Steering Group including international experts and delegates from Eurostat and the Unesco Institute of Statistics. Previous editions of the OM were published in 1992, 1997 and 2005.

³ The Manual, named after the city of Oslo, was originally intended as a further addition to the family of methodological manuals issued by the OECD in the field of science and technology (S&T) statistics. As the oldest, which deals with research and development (R&D) statistics, was named after the town where the meeting approving it took place – Frascati, in Italy – also the other manuals have been following the same rule.

nor in the structure of innovation surveys' questionnaires. This is mainly due to the reluctance by producers and users of official statistics to introduce substantial changes in the well-established definitions of phenomena under measurement. It is to be expected that the OM 2018's main impact will be delivered in the conceptualization of innovation with a few but relevant changes introduced in it. With reference to the basic innovation concepts, the key features of the OM 2018 are the following:

- As far as statistical concepts and classifications are concerned, a higher consistency of the OM with the International System of National Accounts (SNA)⁴.
- A wider concept, and definition, of innovation to be potentially adopted across all the SNA sectors, thus beyond the business enterprises sector whose innovation measurement the Manual is formally devoted.
- A strong focus on the "innovation objects" that are now the main targets of the statistical analysis.
- The revival of the dualism "product/process innovation", abandoned in the OM 2005 (by introducing two additional dimensions of innovation: organization and marketing) and now revived in a more comprehensive fashion.

In this article, the implications of these changes will be discussed with reference to some key issues currently under debate in the economic literature regarding the influence of digital transformation⁵ on the economics of innovation and, more specifically, on innovation statistics.

A starting point is the demand for more accurate indicators to address both long-standing, but still unmet, challenges in economic statistics – like the availability of a proper classification by economic activity – and new emergencies, such as the impact of digital transformation on the overall range of statistical indicators. Innovation statistics are fully affected by these shortcomings that lead to some key measurement issues:

- How can the concept of "product innovation" be understood in a context of servitization of manufacturing, dematerialization of the industrial output and diffusion of customer-based value co-creation processes.
- To what extent the definition of "innovation implementation" given in the OM 2018 is consistent with an evolving market environment.

⁴ SNA classifications and definitions are codified in United Nations (2009).

⁵ To be intended as "the systems-level restructuring of economies, institutions and society that occurs through digital diffusion" as defined in Unruh and Kiron (2017).

- How are the digitalization processes affecting business innovation strategies and to what extent their influence can be statistically measured.

Such issues will be discussed in the next paragraphs with reference to the OM 2018 guidelines and, more broadly, to the evolution in the measurement of business innovation by considering the extent to which economic theories and management practices have been able to influence the way business innovation is currently perceived and measured.

BUSINESS INNOVATION OR INDUSTRIAL INNOVATION?

Innovation statistics, as a branch of business statistics, have flourished in the '80s of the last century in the context of a Schumpeterian revival often identified with the publication of several seminal contributions to the economics of technical change (Smith, 2005). They include: Rosenberg's re-consideration of the role of R&D in the innovation process (Rosenberg, 1982), the overcoming of the linear model of innovation (Kline & Rosenberg, 1986), the Nelson and Winter's evolutionary theory of economic change (Nelson & Winter, 1982) as well as the Freeman's economics of industrial innovation (Freeman, 1974) "which for a long time had a virtual monopoly in presenting the 'state of the art' of knowledge in the field" (Fagerberg *et al.*, 2012; Fagerberg & Verspagen, 2009).

The concept of industrial innovation has been a cornerstone of the pioneering efforts of surveying the enterprises' innovation activities. The first two editions of the OM (1992 and 1997) were extensively using such concept, which is still used, although in the broader realm of "industrial statistics", by several countries' official statistics agencies (including the United States' ones) as well as by the statistical institutions of the United Nations.

In its current use, however, *industrial innovation* solely refers to the innovation performed by industrial enterprises, which is only a fraction of the more comprehensive

business innovation that encompasses innovation undertaken by both industrial and service enterprises.

Indeed, around the turn of the century, the increasing relevance of service industries, both in the economy as a whole and in economic statistics, led a number of statistical institutions, like the Statistical Office of the European Commission (Eurostat) and the OECD's Statistical Directorate to adopt the broader definitions of "business statistics" when defining data production regarding activities undertaken by businesses, or for-profit, units⁶. Thus, the term business innovation became popular in the literature by replacing that of industrial innovation⁷.

Since the publication of the OM 1992 and the launching of the first Eurostat's Community Innovation Survey (CIS), many criticisms were raised on the focus of both the Manual and the survey on an innovation model largely based on the production of artifacts (technological product and process innovation) and a sectoral coverage restricted to manufacturing firms. Referring to the criticisms directed at the Oslo Manual and related surveys at their early stage, Smith (2005) argues, "*... it seems to be the case that CIS works well for manufacturers, but not for the extremely heterogeneous services sector and its often intangible outputs. The analyses of Djellal and Gallouj (2001) and Tether and Miles (2001) suggest the need for quite different approaches to data gathering on services. In defence of the CIS approach it can be argued that it is, and was intended to be, manufacturing specific and that extension to services would always be problematic*"⁸. An

⁶ In this perspective, "industrial statistics" is meant to be a sub-category of "business statistics", i.e. economic data on the following industries: mining, manufacturing, electricity and water supply, sewerage, waste management and remediation activities (ISIC Section B, C, D, and E). For a discussion about the blurring boundaries between manufacturing and services, see De Backer *et al.* (2015).

⁷ It is interesting to note that in a key reference work in innovation studies – the 1995 Handbook of Industrial Innovation edited by Dogson and Rothwell – which was assumed focusing on "industrial innovation", a chapter by Ian Miles was devoted to "innovation in services". On the other hand, Google Trends confirms that the term "business innovation" has been constantly more searched than "industrial innovation", at World level, at least since 2004 (although "industrial innovation" was very popular in Web searches from Canada and Germany until 2009).

⁸ Godin (2002) was even more categorical: "... The measurement of science and technology had been biased by a hierarchical approach ever since the first edition of the Frascati manual. The manufacturing industries took precedence over the service industries in surveys, for example, and national R&D surveys were initially concentrated on the natural sciences and only later included the social sciences. Finally, related scientific activities have always been systematically excluded from surveys. All in all, current statistics "were built on the bricks and mortar model"."

answer to the need of including services in innovation statistics was given in the OM 1997 (second edition) but the change was only formal. Eight years later, the OM 2005 (OECD/Eurostat, 2005, p.11) thus described its new effort to meet the needs of service industries in the OM framework: *"While the second edition of the Manual covered services, it primarily focused on manufacturing industries. However, innovation in services-oriented sectors can differ substantially from innovation in many manufacturing-oriented sectors. It is often less formally organised, more incremental in nature and less technological. In order to establish a framework that better accommodates this broad range of industries, this edition modifies a number of definitions, terms and concepts."*

THE EMERGING OF SERVICE INNOVATION

Conceptualization and measurement of service innovation have attracted scholars' attention since the mid-Nineties in parallel with the efforts of giving services a definite role in the economic disciplines (Gallouj & Savona, 2010; Carlborg *et al.*, 2014). Many contributions have shed light on the peculiar role played by the service sector in the innovation processes – among others, Gallouj (1994), Gallouj and Weinstein (1997), Miles (1995) and (2005), Den Hertog 2000; Howells and Tether (2004), Tether (2005) – with the aim of rejecting the *technologist* view, largely influenced by Pavitt (1984), of a service sector as pure adopter of technologies and equipment developed by the manufacturing sector. The complexity and heterogeneity of innovation in the service sector was further acknowledged as a result of a remarkable research effort that set the basis for a broader conceptual and measurement framework⁹ able to accommodate most of the cases

⁹ Djellal and Gallouj (2018) have identified fifteen advances achieved, over the last twenty years in service innovation studies (SIS):

Advances in the recognition of SIS, in general theoretical perspectives and in understanding of the nature of innovation

1. From non-innovative services to services as simple adopters of technological innovations
2. From services as simple passive adopters to services as active adopters – and even producers of technological innovations
3. From services as adopters/producers of technological innovation to services as producers of specific innovation forms

emerging from innovation surveys which were extended, since 1997, to cover a range of service industries (Djellal & Gallouj, 2001; Drejer, 2004).

This new body of literature often highlights the evolution from a *technologist or assimilation approach* (which argues that innovation is mostly technological and developed in manufacturing industries, with service industries only adopting it) to a *differentiation or demarcation approach* thus emphasizing an increasing awareness of the role of service industries as generators of innovations (not necessarily technological ones). This process has also influenced the evolution of the Oslo Manual and related surveys through a three-stage process that can be described as follows:

- a) starting with the measurement of only product and process (i.e. technological) innovation in manufacturing firms (OM, 1992, and CIS, 1992: industrial innovation),
- b) then evolving by including service firms in innovation surveys' samples but still within the OM 1992 conceptual framework (OM, 1997, and CIS, 1996),
- c) finally, introducing an industry-neutral terminology (business innovation) and a broader concept of innovation, with respect to the previous focus on technological innovation, in order to improve the coverage of service innovation (OM, 2005).

Even though, because of such evolution, "demarcation" surveys have become a standard after the year 2005, the controversy about the role to be given to service innovation was

4. From innovation in certain specific service sub-sectors to innovation across all service activities

5. From innovation in services to innovation through services

6. From innovation in services to service innovation (everywhere)

7. From publications in existing journals to the creation of specialized journals

Advances in innovation operating modes and institutional and regulation arrangements

8. From the 1992 edition of the Oslo Manual to the 2005 edition

9. From assimilation surveys to demarcation and integration surveys

10. From assimilation policies to demarcation and integration policies

11. From the search for productivity to the search for performance

12. From natural interactivity to linearization and back to interactivity

13. From services industrialization to goods servitization

14. Balancing the intrinsic tension between service standardization and service customization

15. Balancing the intrinsic tension between service extension and service regression

not yet settled when the last OM revision started in 2015. The OM 2018 was expected to address the issue conclusively.

Indeed, service innovation is a concept the OM 2018 extensively uses. On the one hand, the progress achieved by the OM 2005 is acknowledged ("*The identification of product and process innovation with technological change was abandoned in order to include service innovations that significantly improved user experiences without necessarily having a technological component*", OECD/Eurostat, 2018, p.15) and, throughout the Manual, the need to systematically include both goods and services in the definition of new products is constantly stressed.

- On the other hand, some technical and conceptual issues are not yet fully covered:¹⁰
- distinction between goods and services;
- integration of goods and services in servitization strategies;
- distinction between processes and services (as products).

THE GRAY AREA BETWEEN GOODS AND SERVICES: THE SERVICITIZATION ISSUE

As already mentioned, a key feature of the OM 2018 is that of reinforcing its consistency with the SNA framework. Thus, innovation statistics are now fully dependent on SNA definitions, including those on goods and services (OECD/Eurostat 2018, p.40). The challenges to be faced in order to operationalize the SNA distinction between goods and

¹⁰ A broader issue, not discussed here, is that about the ability of current statistical classifications to separate manufacturing and service firms (Christensen, 2013). The limitations of the official classification by economic activity, ISIC, in taking into account the growing diffusion of multi-activity firms are extensively discussed in the literature. Nonetheless, the results of innovation surveys (including the European CIS) are regularly diffused according to an industry breakdown (with service firms accounting for 50.8% of the total EU reference population of CIS firms in 2014).

services – when dealing with business, including innovation, surveys – are well known and extensively discussed in the OM 2018 both in chapter 2¹¹ and in chapter 3.¹²

Unfortunately, no guidelines are given in the OM 2018 (OECD/Eurostat, 2018, p.61) on how to meet such challenges when collecting data on innovation. The Manual just recommends: *“At a minimum, [...] to collect data on both goods and services. Surveys should specifically refer to services to ensure that the questions are relevant to respondents from service sector firms.”* In general, OM 2018 acknowledges that goods and services cannot be easily split into two distinct groups but, at the same time, argues that such a distinction is needed for a range of purposes: a) to classify innovations by type (OECD/Eurostat, 2018, p. 60), b) to report the share of sales accounted for by product innovations (OECD/Eurostat, 2018, p. 164¹³) and c) to report about the characteristics of the focal, most important innovation (OECD/Eurostat, 2018, p. 204).

Totally ignored in the OM 2018 is also the issue of the servitization of manufacturing products¹⁴ which is both a driver and a consequence of the digital transformation affecting the manufacturing sector and is usually referred to as the fourth

¹¹ OECD/Eurostat, 2018, p. 41: “The boundary between a good and a service can be difficult to identify and is subject to constant change. The provision of goods can shift to service-based models and vice versa. Furthermore, some products can combine features of both goods and services, for example, knowledge-capturing products that concern the provision, storage, safekeeping, communication and dissemination of information that users can copy, share and access repeatedly have features of both goods and services (see Chapter 3). Digital technologies have contributed to an increase in the variety of information and knowledge-based products available, as well as the ways in which production (understood in a general sense) and consumption takes place in all SNA sectors.”

¹² OECD/Eurostat, 2018, p. 61: “As noted in Chapter 2, the dividing line between goods and services can sometimes be difficult to establish and some products can have characteristics of both. A company can sell goods to its customers or rent their use as a service, as is often the case for durable consumer goods and for assets for business production. Firms can also bundle ancillary services such as service contracts or insurance with their goods.

Knowledge-capturing products (as identified in the SNA) can have the characteristics of either a good or service and concern the provision, storage, safekeeping, communication and dissemination of digital information that users can access repeatedly. These products can be stored on physical objects and infrastructure, such as electronic media or the Cloud. An example is when access to digital products such as music, films and books is provided on demand to consumers for a fee. Knowledge-capturing products are similar to a good if consumers can share or sell them to others after purchase, but they are similar to a service if the consumer's rights are limited by a license that restricts sharing or selling. Digital technologies, through reducing the cost of copying and exchanging information to a negligible amount, have contributed to the proliferation of knowledge-capturing products.”

¹³ OECD/Eurostat, 2018, p. 164: “Under some conditions it may be possible to disaggregate the innovation sales share by type of product innovation (goods or services), or by the location of sales (domestic or foreign markets). However, disaggregation by type of innovation will be difficult for firms that combine goods and services into a single product, such as when capital equipment manufacturers combine equipment sales with a service maintenance contract.”

¹⁴ To make a distinction from the overall servitization process, i.e. the increased importance of the service sector in industrialized economies (Available at: https://en.wikipedia.org/wiki/Service_economy. Accessed in 6 July 2019). Examples of firms' experiences can be found in West (Shaun) *et al.*, 2018.

industrial revolution¹⁵ (or Industry 4.0). That of servitization is neither a new trend – dating back to the pioneering introduction by Rolls-Royce of the *power-by-the-hour*¹⁶ concept in the '60s – nor is it unknown in the literature (Vandermerwe & Rada, 1988; Baines *et al.*, 2009; Santamaria *et al.*, 2012; Lightfoot *et al.*, 2013; Lanz & Maurer, 2015; Fontagné & Harrison, 2017).

Not surprisingly, as a well-established trend within the process of digitalization of manufacturing firms, many contributions and analyses on this subject can also be found in business management literature. An interesting concept used in management is that of an "outcome-based economy" i.e. *"an economy in which value is driven by the delivery of complete solutions that meet a need—in other words, outcomes. In this type of economy, companies will compete on their ability to provide outcomes, rather than just products"* (Accenture,¹⁷ February 2017). This could be seen as the essence of servitization that is not at all a minor phenomenon as it is already quite widespread in manufacturing firms¹⁸ and further fueled by the new capabilities made available by the adoption of advanced digital technologies (mostly by the smart use of Big Data and the Internet-of-Things). This trend will probably radically affect the future measurement of business innovation. At stake, here, it is not the ability to make a distinction between goods and service innovation but rather the meaningfulness of the concept of product innovation itself.

¹⁵ The term is usually credited to Klaus Schwab, Chairman of the World Economic Forum (Schwab, 2017). More information can be found at the WEF website (<https://toplink.weforum.org/knowledge/explore/4th-industrial-revolution>).

¹⁶ In 1962, Rolls-Royce developed a new business model by selling fully maintained aero engine use by the hour, rather than by the unit.

¹⁷ Available at: <https://www.accenture.com/us-en/blogs/blogs-outcome-based-economy-emergence-chemicals> (Accessed in 6 July 2019)

¹⁸ In a survey among UK industrial firms (sample size not known) carried out for the Annual Manufacturing Report 2018 (Hennik Group, sponsored by PwC and others, May 2018), 79% of surveyed manufacturers said "digital technologies will help broaden their customer base via service-based offering (servitization)" (Available at: <https://www.themanufacturer.com/wp-content/uploads/2018/05/AMR-2018-Amended-May-2018.pdf>) Accessed in 6 July 2019. A survey of 750 manufacturers in 16 countries (Antony Bourne, Servitization: Preparing The Manufacturing Industry For What's Next, Ifs White Paper, February 2017) found that 70% of respondents were offering some level of servitization (Available at: <https://www.ifsworld.com/corp/sitecore/media-library/assets/2017/02/16/servitization-and-manufacturing-white-paper/> Accessed in 6 July 2019).

VALUE PROPOSITIONS AND BUSINESS MODELS

Business management literature offers another useful concept to extend our understanding of business innovation: that of *value proposition*:¹⁹ literally, "an innovation, service, or feature intended to make a company or product attractive to customers"²⁰ (Hassan, 2012; Osterwalder & Pigneur, 2010; Osterwader *et al.*, 2014). It implies that every time a new product is marketed, customers will rate it according to several criteria. They include the assessment of some key features of the good or service, such as price, quality, speed of delivery and completeness of the supporting services but also of a new dimension: that of the relationship between the customer and the producing company. This encompasses the value of the company's brand, the options of linking it to additional devices or services and even the emotional appeal of the company (or of its goods and services) for customers (factors only partially captured by the OM category of design innovation).

Defining a successful value proposition is not just about marketing but also about the effectiveness of the overall firm strategy and, most importantly, of its business model. If innovators will no longer be concerned with bringing on the market "products" but rather "value propositions", the focus of innovation will have to be redefined through a two-steps perspective:

- a) a technical, or technological, effort to improve the product itself (either a good or a service), which is similar to the traditional Oslo Manual's view of "product innovation" (before introducing it on a market) and
- b) a strategy of product delivery, based on a clear business model focusing on the interaction with customers in order to generate a successful value proposition that could make the innovation successful in a life-cycle perspective.

¹⁹ "The phrase "value proposition" (VP) is credited to Michael Lanning and Edward Michaels, who first used the term in a 1988 staff paper for the consulting firm McKinsey and Co. In the paper, which was entitled "A business is a value delivery system", the authors define value proposition as "a clear, simple statement of the benefits, both tangible and intangible, that the company will provide, along with the approximate price it will charge each customer segment for those benefits". [...] According to Hassan [2012], however, there is no specific definition for Value Proposition." (Available at: https://en.wikipedia.org/wiki/Value_proposition#cite_ref-1 Accessed in 6 July 2019).

²⁰ Available at: <https://www.dictionary.com/> (Accessed in 6 July 2019)

By stressing this approach, it could be said that business innovation can be described only with reference to a specific business model. Moreover, it is often related to a *business model innovation* (Massa & Tucci, 2014; Johnson *et al.*, 2008; Chesbrough, 2007; Chesbrough *et al.*, 2013) of which an effective value proposition is a key component (Lindgardt *et al.*, 2009). Different business models could require the undertaking of various combinations of innovation activities and, as a result, different outputs in terms of product and process innovations. By considering the on-going process of digital transformation, changes in business models have become more frequent, at least as a defensive move, even in small and medium enterprises (Rachinger *et al.*, 2018; Bouwman *et al.*, 2018). This is going to influence frequency and composition of innovation activities that can be hardly evaluated outside the context – i.e. the business model – where they have been generated.

While the OM 2018 was expected to introduce such a dynamic perspective in official innovation statistics, the OECD made a different choice by keeping the dualism between product and process innovations at the center of the scene. In the OM 2018, business model innovation is seen only as the combined change – to be assessed ex-post, rather than ex-ante – of a number “*of business processes such as the production, logistical, marketing and co-operative arrangements in use as well as the main products that a firm sells, currently or in the future, to achieve its strategic goals and objectives*” (OECD/Eurostat, 2018, p. 66). The OM 2018 approach relies on two assumptions:

- a) “*there is no single, recognised definition of a business model innovation*” (OECD/Eurostat, 2018, p. 66), which is true as shown by Foss and Saebi (2017), nevertheless a rich literature on this subject offers a lot of alternative definitions;
- b) it is difficult to make a distinction between comprehensive and partial, or even multiple, business models (and innovation thereof).

As a consequence, according to the OM 2018: “*It is not recommended to directly collect data on business model innovation as a distinct, stand-alone category through innovation surveys because of the difficulty in differentiating partial business model innovations from*

other types. However, the occurrence of comprehensive business model innovations could be estimated through analysis [...] that combines information on the types of innovations introduced by a firm with other questions on innovation objectives, including a question on the objective of establishing a new business model [...]." (OECD/Eurostat 2018, p.67). Such choice will negatively affect the comparability among innovators who, though operating in the same industry or market, when introducing new products and processes adopt different strategies and business models.

AND IF SERVICES WERE REALLY DOMINANT?

Beyond the issue of discriminating between goods and service innovation, assuming it is possible and useful to do it, another long-standing issue in the measurement of service innovation – that of separating service and process innovations – is still largely unaddressed. Such issue is widely discussed in the literature (Gallouj & Savona, 2010) which points out that delivered services are often virtually indistinguishable from the processes used to deliver them. In the OM 2018²¹ the issue is addressed by simply acknowledging that respondents to innovation surveys can potentially report about multiple innovations that belong to various innovation types²² in an aggregated way even though – as it is implicitly accepted by mentioning previous OECD works in this area (e.g.

²¹OECD/Eurostat, 2018, p. 66: "A business process innovation can significantly improve the quality of a product, resulting in a joint business process and product innovation.

- A product innovation can require a supporting business process innovation. This is particularly common for service innovations. For example, a new online function for selling information products is both a business process innovation (requiring information and communication technology [ICT] and web development) and a service innovation for potential users. If it creates a new sales channel for the first time, it can also be a marketing innovation.
- Product and business process innovation can be closely intertwined, especially when the process is not distinguishable from the product. This applies particularly to services for which production, delivery and consumption occur simultaneously."

²²OECD/Eurostat, 2018, p. 59: "Product innovations are divided into two main types, while business process innovations are divided into six broad types [...]. A single innovation can involve combinations of different types of product and business process innovations. Consequently, the typology of innovation types by object is not a classification of mutually exclusive categories. Furthermore, a firm can introduce more than one type of innovation over the observation period for data collection. It is therefore recommended to collect information on multiple types of innovations on the assumption that the responses can refer either to different innovations or to innovations that combine two or more innovation types."

Frenz & Lambert, 2012) – the data collected will be more useful for analytical than for statistical purposes.

This highlights the issue of the *complementarity between innovation types*. Ballot *et al.* (2015) have found evidence of a high level of complementarity between product and process²³ innovations in small innovating firms in France and UK, which raises a fundamental question about the ability of respondents to make a clear distinction between such broad innovation categories. In order to overcome this issue, at least the concept of service innovation should be better defined. A review by Snyder *et al.* (2016) found four main, commonly used categorization criteria that could be potentially adopted in order to qualify service innovations:

- by change (radical vs. incremental),
- by newness (new to the market vs. new to the firm),
- by means of provision (technology vs. organization) and, finally,
- by type of change (product vs. process).

The latter, which is ranked as the second most common, highlights the polymorphic nature of service innovation that, by providing the conditions to develop additional innovations, often plays a strategic role in the innovation process itself. In this perspective, Salunke *et al.* (2013) have proposed a further distinction between *interactive* (or external) and *supportive* (or internal) service innovations: "*This conceptualization focuses on value co-creation and customer experience. Interactive service innovations potentially create sustainable competitive advantages, whereas supportive service innovations offer no such direct effect. Innovative changes that the customer discerns and experiences (interactive service innovations) provide avenues for implementing a superior value-creating strategy difficult for competitors to duplicate*". This interpretation is based on the pervasive role of service innovation which, mostly when coupled with digitalization

²³ In the restricted meaning adopted in the OM 2005, i.e. "technological" process innovation that is "... the implementation of a new or significantly improved production or delivery method" (OECD/EUROSTAT, 2005, p. 49).

processes, it is essential to improve the internal efficiency of firms and, in terms of new services offered on the market, contributes to enrich their value proposition.

This approach has also been conceptualized, once again at the crossroad between economics and management studies, as a Service-Dominant logic (SDL) (Vargo & Lusch, 2004; Vargo *et al.*, 2008). The SDL view is, shortly, that all exchanges are based on services, and that:

...when goods are involved, they are tools for the delivery and application of resources. That is, goods are service-delivery vehicles. In S-D logic, knowledge and skills are key resources for competitive advantage... (Vargo & Lusch 2004 cited in Vargo *et al.*, 2008, p. 147).

The same article clearly describes the implications in terms of value creation:

*For S-D logic, value results from the beneficial application of operant resources, which are sometimes transmitted through operand resources or goods (Vargo & Lusch, 2004). Thus, from this view, value is co-created through the combined efforts of firms, employees, customers, stockholders, government agencies, and other entities related to any given exchange, but is always determined by the beneficiary (e.g., customer). (Vargo *et al.*, 2008, p. 148).*

Without going into further detail, the impact of such an approach on the conceptualization of service innovation is self-evident and calls for a re-consideration, from the SDL perspective, of several elements already described: the servitization processes, the co-creation of value as a result of a successful value proposition and the key role of customers in making new business models successful.

Additional studies have been focusing, more specifically, on the contribution SDL could give to the conceptualization and measurement of service innovation (Ordanini & Parasuraman, 2011; Edvardsson & Tronvoll, 2013; Kohronen, 2014; Lusch & Nambisan, 2015). This allows for comparing the OM 2018 to alternative approaches and to draw lessons for improvement of the official statistics' measurement exercises. Huarng (2018) effectively describes the key features of the current business innovation conceptualization according to the SDL view:

First, innovations are not developed solely within the boundaries of organizations. As well as arising from internal sources, innovations occur in collaboration with an extensive network of external agents, including suppliers, partners, and customers

(Chesbrough, 2003; Sawhney and Nambisan 2007). Second, the core elements of innovations are not only tangible, but also intangible, taking the form of information that is transferred to customers. The emphasis has thus shifted from the physical attributes of goods to the values or experiences that are perceived by customers (Prahalad & Ramaswamy 2004; Vargo & Lusch, 2004, 2008; Lee, 2015). Third, innovations can shape the strategy of organizations (Lee & Olson, 2010). Innovations are now considered part of the broader context of supplier–customer relationships (Cantista & Tylecote, 2008). Organizations aim to develop a continuous flow of innovative solutions to specific customer problems. The notion of innovations no longer refers to something new in absolute terms but rather something that is new for a particular customer. (Huarng et al., 2018, p. 454.).

Several views find a convergence in this approach.

- First of all, that of *open innovation* (Chesbrough, 2003; West & Bogers, 2014; West (Joel) et al., 2014; West & Bogers, 2017) as a widely accepted paradigm that assumes that "*firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology*" (Chesbrough, 2003). This short definition also includes the notion that innovation has to be implemented in a business model open to both knowledge inflows and outflows, and to systematic cooperation with external partners through market and non-market relationships.²⁴
- Second, the inclusion in a consistent conceptual framework of both the *tangible* and *intangible* contents of innovations whose combination contributes to value creation and co-creation as the ultimate objectives of business innovation.
- Third, a re-interpretation of the feature of *novelty*, no longer dependent on the technical attributes of the innovation output but generated as a result of the relationship between innovators and customers.

In this context, the issue of value co-creation, i.e. the existence of a "*value- and/or experience-centric focus*" (Lusch & Nambisan, 2015, p. 156), is of paramount importance. Thus, the OM 2018 emphasis on the dualism both between tangible-intangible innovation outcomes (goods vs. services) and between producers and customers becomes irrelevant. The process can be essentially described as starting with a *Producer* issuing a *Value-proposition* that triggers a *Value Co-creation* interaction where the *Customer* plays an essential role in evaluating the attractiveness of the production output, thus enabling such co-creation of value. Shortly, in the *goods-dominant logic* service offerings are

²⁴ The "open innovation" approach has been introduced in the Oslo Manual for the first time in its fourth edition (OM 2018) by amending a confused reference in the OM 2005 to open ("open information sources") as a synonym of free ("This notion of "openness" does not necessarily imply that knowledge is free of charge [i.e. "gratis"] or exempt from use restrictions [i.e. "libre"]." OECD/Eurostat, 2018, Box 6.1 p. 125). On the other hand, the OM 2018 adopts only partially the canonical concepts and terminology of the open innovation theory (as developed by Chesbrough and others) in order to keep a consistency with the OM 2005 approach of measuring, in innovation surveys, inter-institutional "linkages" rather than genuine knowledge flows.

"designed with value" while in the SDL the value is always co-created with the customer through the activation of sets of resources (Edvardsson & Tronvoll, 2015). The consequence of this change of paradigm in the definition of the business innovation process is that of a substantial redefinition of the key stage when an innovation can be identified as such (also defined as the *innovation implementation* stage, see Gault, 2018).

THE IMPLEMENTATION DILEMMA

Throughout its four editions, the Oslo Manual has been consistent in its view that the innovation implementation is achieved when a producer deems the output of an innovation project as sufficiently developed to be (potentially) marketed. With respect to this approach, the SDL suggests that the implementation stage should be logically extended to include the role of the customer as co-innovator as well as the influence of the *service system*, i.e. the context where implementation takes place.

Yet, when one compares how *product innovation*,²⁵ has been defined in the second, third and fourth edition of the Oslo Manual some substantial differences in the conceptualization of innovation implementation can be pointed out (Table 1).

Table 1. How OM definitions of innovation have been dealing with "implementation" over time.

OM 1997	<ul style="list-style-type: none"> • A technological product <i>innovation is the implementation/commercialisation</i> of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer.
OM 2005	<ul style="list-style-type: none"> • An <i>innovation is the implementation</i> of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. • A product <i>innovation is the introduction</i> of a good or service that is new or significantly improved with respect to its characteristics or intended uses.
OM 2018	<ul style="list-style-type: none"> • A business innovation is a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm.

²⁵ It is worth to remember that the three definitions all include both goods and service innovations.

	<ul style="list-style-type: none"> • <i>A product innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market.</i>
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Source: prepared by the author (Perani, 2019).

The most striking difference is that in OM 1997 and in OM 2005 *innovation is the implementation* while, in OM 2018, *innovation is the output* (product or process). This changes dramatically the understanding of innovation, which was previously based on the innovator's activities (subject approach) and now is going back to the pre-Oslo Manual emphasis on innovation outputs²⁶ (object approach). This change of definition is not without risks: it works well with reference to goods but if we accept the view that goods are increasingly merged with services and that services are often clustering by generating comprehensive value propositions, how can single innovations be identified and properly compared with each other?

On the other hand, this change of perspective does not affect the relevance of the implementation as the stage where the output of an innovation project (an idea, a prototype, a blueprint, etc.) becomes an "innovation". At the beginning of the OM 2018, a key principle of innovation measurement is recalled: "*Innovation is more than a new idea or an invention. An innovation requires implementation.*" (OECD/Eurostat, 2018, p. 31). Immediately after this statement, the new OM 2018 approach is delivered by describing how implementation (i.e. turning a product into an innovation) takes place: "*either by being put into active use or by being made available for use by other parties, firms, individuals or organisations*". Two criteria are mentioned here, "use" and "availability", where it is clear that the more generic one (availability), if used for classification purposes, prevails on

²⁶ Here the terminology suggested by the Oslo Manual 2018 is adopted. OECD/Eurostat, 2018, p. 230: "The innovation literature commonly distinguishes between different stages of an innovation process, beginning with inputs (resources for an activity), activities, outputs (what is generated by activities), and outcomes (the effects of outputs)".

the other (use) even if only because a product, before being used, has to be made available to potential users.²⁷

Not surprisingly, these two criteria have generated *two different definitions of innovation* given, respectively, in chapter two and three of the OM 2018. The rationale for this dualism is that of emphasizing the difference between a *broad definition* that could serve the need of identifying generic innovation evidences across all SNA sectors (businesses, public institutions, non-profit institutions, households, etc.) and a *more specific (and traditional) definition* to be used for data collection in business innovation surveys²⁸.

From a technical point of view, to deal with two definitions of innovation, although consistent each other, will raise the need, in order to prevent any misunderstanding, to thoroughly inform both data providers and users of statistics which one is adopted in data production.

From a logical point of view, it can be pointed out that the broader definition is based on a generic availability concept (*making something new available to potential users*), while the *business innovation definition* is based on a qualification of such availability concept: that of "introduction on the market" that should be interpreted as equivalent to "availability to potential customers" (thus a specific sub-case of the broader definition mentioning only potential users). The broad and strict definitions are compared in detail in Table 2.

²⁷ In the OM 2018, the implementation issue is discussed in paragraph 2.2.4 at page 34 but without suggesting any original criterion but novelty to make a clear distinction between inventions and innovations. A logical remark is that an invention does not become an innovation only because is made available to potential users.

⁸² In order for a new idea, model, method or prototype to be considered an innovation, it needs to be implemented. Implementation requires organisations to make systematic efforts to ensure that the innovation is accessible to potential users, either for the organisation's own processes and procedures, or to external users for its products. The requirement for implementation is a defining characteristic of innovation that distinguishes it from inventions, prototypes, new ideas, etc.

⁸³ At a minimum, innovations must contain characteristics that were not previously made available by the relevant organisation to its users. These features may or may not be new to the economy, society, or a particular market. An innovation can be based on products and processes that were already in use in other contexts, for instance in other geographical or product markets. In this case, the innovation represents an example of diffusion. Innovation diffusion can generate substantial economic and social value and is consequently of policy importance. This manual defines innovation to include diffusion processes [...], while providing guidelines for identifying different levels of novelty, including new-to-world innovations." (OECD/Eurostat, 2018, p. 34).

²⁸ The need of introducing in the OM 2018 a broad definition of innovation was argued by Gault 2015 and 2018.

Table 2. A multi-stages innovation implementation approach.

Innovation implementation stages	STAGE A. Generic availability	STAGE B. Availability to customers / Valorization	STAGE C. Value co-creation
Source	Oslo Manual 2018, ch.2.	Oslo Manual 2018, ch.3. European CIS survey (various years)	Service dominant logic. US Survey on the Division of Innovative Labor (Arora et al., 2016, 2018).
General definition	An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).	A product innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market. A business process innovation is a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes and that has been brought into use in the firm.	
Business innovation definition (used in business surveys).		<i>A product innovation is the market introduction of a new or significantly improved good or service with respect to its capabilities, user friendliness, components or sub-systems.</i> <ul style="list-style-type: none"> • <i>Product innovations (new or improved) must be new to your enterprise, but they do not need to be new to your market.</i> • <i>Product innovations could have been originally developed by your enterprise or by other enterprises or organizations.</i> 	<i>In 2009, have you earned revenue from any new or significantly improved products or services in this industry introduced since 2007, where "New" means new to your firm. Also, please exclude simple resale of goods purchased from others or purely aesthetic changes.</i>

Source: prepared by the author (Perani, 2019).

The OM 2018 approach indirectly confirms the understanding of innovation implementation not as a single punctual stage in the innovation process but rather as a

sequence of events/actions; an *implementation continuum*.²⁹ Which single point, along such *continuum*, sets the conversion of an output into an innovation is just a matter of convention.

In Table 2 a simplified example of how such *implementation continuum* could be described is given. Without excluding that further implementation steps could be identified (economic and social impacts, technological feedbacks, systemic spillovers, etc.), three main stages are described in Table 2: let's start with comparing stages A and B.

The first reflects the definition proposed in chapter two of the OM 2018. It has been purposely developed for use in surveys addressing potential non-market "innovators" and, as the innovation "monomania" is spreading throughout society (Kaiserfeld, 2015), it is to be expected that it will be extensively used in future surveys although no actual use of it is reported so far.

The second is based on the definition given in chapter three of the OM 2018 that, in order to keep the consistency with the definition used in innovation surveys so far, does not deviate too much from the OM 2005 terminology and concepts. It still focuses on the criterion of *introducing a product on a generic market* as a condition to identify an innovation, thus highlighting both the availability of a new product to potential customers (not just generic users, as in the previous case) and the valorization of the product itself (by assuming that every product offered for sale in a market should have a price).³⁰

²⁹ Such implementation continuum could be also seen as a segment of an innovation value chain as described in Roper et al. (2008).

³⁰ This is an interesting issue because the OM 2018 has to acknowledge that many products (mostly services, including a number of digitally delivered services) are currently distributed free of charge for users even it cannot be excluded that the producers could be able to generate revenues/profits indirectly, for instance by selling advertising services associated to the original services. These cases do not fit in the OM 2018 chapter three approach unless a new definition of market would be given (it was, of course, beyond the scope of the OM 2018). To address the issue, the OM 2018 implicitly allows for making the chapter 2 definition (generic availability to users) prescriptive also when dealing with business outputs.

The OM 2018 (OECD/Eurostat 2018, p.60) states: "A product innovation must be made available to potential users, but this does not require the innovation to generate sales. Limiting product innovations to those with sales would exclude product innovations that fail to meet established or expected demand or where sales require a longer observation period to materialise. In addition, this would exclude digital products that are offered at no cost to users, with revenue obtained from advertising, monetising user information, or through other methods."

If the first definition should also be adopted in business surveys, thus lowering the threshold for the identification of innovations, many false positives could be found among both innovations and innovators. This would worsen the concerns by users about including in statistics some innovations that, according to the practices used in innovation management, should be classified as *unsuccessful innovations*.³¹

It is worth mentioning that a selection of users/stakeholders of the Oslo Manual, surveyed by Eurostat at the beginning of the OM revision process,³² did ask for a stricter, rather than a looser, OM definition of innovation. They highlighted the needs of: a) reducing subjectivity in innovation surveys, i.e. providing respondents with an understandable and clear-cut definition of innovation implementation; b) capturing more information about the innovation value of a new product and, potentially, its economic and social impact. Similar views were expressed also by reputed scholars, like Professor Bronwyn Hall (University of California) and Professor Ben Martin (University of Sussex), during a 2016 workshop on the measurement of innovation (National Academies, 2016, p. 7). The former, by stressing the need for integrating innovation measurement at micro and macro level, observed that "*for many questions, it is the value of the output of innovation activity that is the most ideal to measure*", and the latter, argued that: "*whether in the market or non-market context, there could be a danger of bringing in incremental product changes that do not have an impact on economic or social outcomes and well-being*".³³

³¹ There are many different estimations about the rate of failure of new products. Even though it is obviously highly differentiated across industries, a 40% of failures is usually seen as a reliable estimation of the average failure rate of new manufacturing products. (Castellion & Markham, 2013).

³² In September 2015, Eurostat launched a survey among academicians and analysts who were contributors to the literature on economics of innovation and/or had experiences in processing innovation surveys' data. One-hundred-eighty experts from a large number of countries answered the survey. Survey results can be made available by Eurostat Unit G4 upon request.

³³ National Academies (2016), p. 55. In May 2016, the US Committee on National Statistics of the National Academies of Sciences, Engineering and Medicine organized an expert workshop, rather than a survey, to discuss concepts and models for measuring innovation with participants from many countries and with a mixed professional background. The on-going revision of the Oslo Manual was a subject of discussion, too. Professor Martin made his intervention by commenting a statement by Professor Eric Von Hippel urging that "Oslo Manual [will] include non-market diffusion [of innovation]" and expressing the opinion that: "Its exclusion from the definition is a barrier to recognizing that activities taking place beyond the market can be innovations".

HOW TO CAPTURE VALUE CO-CREATION

It does not seem that the OM 2018 has been able to accommodate the needs of those advocating for a definition of business (product) innovation that fully considers the potential for value creation or, better, co-creation. Nevertheless, the OM 2018 devotes a whole paragraph (OECD/Eurostat, 2018, p. 34) to value creation:

- *"Value is [...] an implicit goal of innovation, but cannot be guaranteed on an ex ante basis because innovation outcomes are uncertain and heterogeneous".*
- *"Value-related measures are [...] important for understanding the impacts of innovation, although there is no single measure of economic or social value in established statistical frameworks such as the SNA" but "... markets for products and finance fulfil a selection function for innovations by guiding the processes of resource allocation in the Business enterprise sector".*
- *"The realization of the value of an innovation is uncertain and can only be fully assessed sometime after its implementation. The value of an innovation can also evolve over time and provide different types of benefits to different stakeholders."*

In order to sum up the OM 2018 argument, it could be said that:

- value (co)-creation is an innovation goal but since it is uncertain, it is not essential for the identification of the innovation itself;
- markets can select, under some conditions, the potential innovations according to their value but it takes time and, more than a *criterion for the identification* of an innovation, value has to be seen as a *feature of innovations* to be assessed ex-post.

This is another example of adoption of a goods-dominant logic. In the SDL paradigm, the process of value co-creation takes place alongside with the exchange between the producer and the customer and it makes no sense to account for it "sometime after [...] implementation". Only by rejecting the idea that the output of a project (either an invention, a prototype or a model) could become an innovation simply by making it available to potential users will it be possible to develop an alternative approach that could be based on the identification of innovations by assessing their potential for value co-creation.

The stage C described in Table 2 suggests that the interpretation of the OM 2005 definition of innovation given in the successful US survey on the Division of Innovative Labor (DoIL) might allow for a viable alternative.

Unlike the traditional approach of the European CIS, which fully adopts the OM 2005 terminology in its key question to respondents ("Do you have introduced on the market any new or significantly improved good or service during the reference period?"), the DoIL survey (Arora *et al.*, 2016, 2018) goes straight to the point, combining the introduction on the market of a new product and its actual purchase by customers by asking: "In 2009, have you earned revenue from any new or significantly improved products or services in this industry introduced since 2007?". Here a small change in the survey filtering question marks a substantial evolution from collecting information on outputs with reference to the implementation stage B in Table 2 "Availability to customers / Valorization", to the operationalization of the implementation stage C "(potential) Value co-creation".

Two clarifications are needed. First, assessing a potential for value co-creation is useful to qualify as innovations only those inventions, prototypes, etc. that, once introduced on the market, have passed the test of acceptability by customers. Outputs, which though offered on the market do not generate revenues should simply not be seen as "innovations" (not even as failed or unsuccessful innovations). On the other hand, the marketization of a new product is not the final stage of the *implementation continuum*.³⁴ Further stages can be identified where the interaction between producers and customers keeps generating additional exchange and use value for both with potential spillovers on economy and society. It is true, as suggested by the OM 2018, that these phenomena can be analyzed ex-post in order to take into account the additional time they need to be fully developed. On the other hand, there is no reason why innovation surveys – which

³⁴ This point is supported also by the OM 2018 (OECD/Eurostat, 2018, p. 34): "Lastly, implementation is not the final step for an innovative organisation. Follow-on activities to review innovations after their implementation can result in minor improvements or new innovations, e.g. through a fundamental redesign or major improvements. Some of these follow-on efforts could potentially result in innovations in their own right. Post-implementation reviews can also lead to the abandonment of innovations."

are by definition backward-looking exercises – could not ask about the current effects, in terms of market value creation, of innovations whose implementation started during the surveys' reference periods.

Second, the OM 2018 concerns about how to deal with potential product innovations that are not going to be implemented through the traditional commercial channels need also to be taken into consideration. Providing that the co-creation of value resulting from the interaction/co-operation between producers and customers will be kept as a reference, at least three different cases of innovation implementation can be identified:

- New commercial products (goods or services) that are marketed thanks to a successful value proposition and whose level of implementation (adoption by customers) can be, at least as a proxy, measured in terms of revenues/sales (as in the DoIL survey).
- New goods and mostly services that are implemented by means of a co-creation process where producers are not remunerated in terms of direct sales but receive compensations from other sources (e.g. advertising). In this case, an additional indicator of the indirect revenues generated by the use of these "innovations" should be developed, as well as an indicator of their actual use by customers. For instance, with reference to software or cloud services, an indicator of their intensity of use could be developed.
- New services, and partially goods, made available to customers free of charge. This is the case for many online services already available to customers whose number could increase in the future as collaborative or "sharing" business models will further evolve. It includes, for instance, smartphones' applications (apps) that can be freely downloaded from selected digital stores. These are potential innovations that are made available to users/customers in the digital marketplace. In principle, they cannot be considered actual innovations until a significant group of customers has downloaded them and extracted some value (i.e. any kind of value or advantage) because of their use. In this respect, related indicators of use (number and frequency of downloads, rate of appreciation by customers, etc.) would be needed.

Testing new data collection approaches is possible and recommendable in order to extend our knowledge of the *implementation continuum* and to avoid that innovations could be identified at a too early stage of development with the result of inflating the total estimated number of innovations (and innovators).

INNOVATION IN A DIGITALIZED ECONOMY

The key driving force that should have suggested the introduction in the Oslo Manual of an SDL oriented view – so to focus on the value co-creation potential of business innovations, rather than on their qualitative level subjectively assessed by survey respondents – is the digital transformation of the business sector.³⁵ To understand the effects of the pervasive influence of digitalization on business in general, and on business innovation in particular, is a key topic currently under consideration by economists (Teece, 2018³⁶). On the measurement side, it is probably the main challenge official economic statistics have to face since after World War II.

The SNA is on the forefront (Ahmad & Schreyer, 2016) in dealing with this challenge and several national and international initiatives have been already launched in order to reconsider some fundamental SNA definitions and estimation procedures by taking into account the emerging economic phenomena generated by digital transformation, as it is the case of Nakamura *et al.* (2017) who try to incorporate the *digital free economy* into the SNA framework.

Innovation statistics should be equally concerned about redesigning their conceptual basis in order to properly account for new emerging phenomena that influence the measurement context, thus avoiding that the diffusion of digital technologies could lead to an over-estimation of the innovation efforts even when such technologies are adopted only as a standard replacement of outdated infrastructures or practices.

The OM 2018 describes in a detailed way (OECD/Eurostat, 2018, paragraph 5.5.3, page 112) the potential impact of the digitalization processes on firms activities and, indirectly, on their innovation projects. The focus of the OM 2018 is indeed on assessing

³⁵ This is, of course, a megatrend whose boundaries can be hardly set. A generic introduction can be found in Brynjolfsson and McAfee (2014) and a definition in Unruh and Kiron (2017).

³⁶ "The value-capture problem for innovators in the digital economy involves some different challenges from those in the industrial economy. It inevitably requires understanding the dynamics of platforms and ecosystems." (Teece 2018).

the digital capabilities of firms rather than on evaluating the actual impact of digitalization on business processes, so for data infrastructures connecting various business functions, as well as for the remote storage and processing of business data. As a consequence, the OM 2018 draws the conclusion that, as

...digital-based innovations are widespread, with respondents noting their use in a very high share of innovations in all industries [...] there is little value in identifying innovations that contain or were developed through the use of digital technologies. Instead, data collection should obtain information on the digital competences of firms as a key component of their innovation capabilities.

Unfortunately, even questions on digital capabilities should not be asked, according to the OM 2018, in innovation surveys but, if possible, in dedicated business surveys on information technologies' capabilities.³⁷

This OM 2018 recommendation is not surprising in a conceptual framework based on a static and firm-centric idea of product innovation. Unfortunately, this *goods-dominant logic* is no longer able to effectively describe what happens in the real world where even goods – like, for instance, gaming consoles, smartphones or sport wristbands – are not competing in the market only on their intrinsic technical quality (also because most of them are based on the same technological platform or incorporate the same components of their competitors) but mostly on the attractiveness of the value proposition they offer to customers. This includes: the reputation of the brand and its allurements, the number of people to be potentially connected through these devices (with special attention at the customers' own environment), the ability to connect to other devices from the same brand or from other brands, the availability in terms of number and quality of software applications or digital games to be run on the device, the support

³⁷ "Dedicated ICT surveys (OECD, 2015b) are the main instrument for collecting data on ICT use by firms. The most cost-effective option that also reduces response burden is to link data on digital capabilities and usage from ICT surveys with data from innovation surveys. If no dedicated ICT surveys are conducted in a country, or if data linkage is not possible, innovation surveys can opt to directly collect data on the use of digital technologies." (OECD/Eurostat 2018, p.113); "digital competences (may be collected through dedicated ICT surveys)." (OECD/Eurostat, 2018, p. 114).

given by the producer and the potential access to the community of customers, etc.³⁸ To develop such a composite value proposition a strategy and a business model based on an SDL view are needed. In addition, an open innovation approach can help to share knowledge and data with other firms to allow for interoperability and unconditional access to common resources (e.g. software), as well as for an effective communication with customers, which could make further value co-creation possible.³⁹

In order to understand whether the potential of digital technologies has been effectively used by firms for innovation purposes, evidence of the adoption of a value co-creation strategy should be looked for. To ask survey respondents about the development of internal digital capabilities is not enough. The statistics community will have to develop in the near future a new logic consistent with the structural changes taking place in the economy as a result of the diffusion of digital technologies. Infrastructures, platforms and services are constantly evolving and are affecting the behavior of innovators who are increasingly interacting with external networks and clusters of capabilities.

Nambisan *et al.* (2017) offer an example of how research on innovation management is affected by the overwhelming digitalization processes by arguing that three pillars of innovation research could be shaken by the new paradigm: a) innovation processes are being shaped by the interaction of a number of products, platforms and services that affect the nature, direction, timing and objectives of the processes themselves; b) innovation agencies cannot be predefined because they evolve as a result of the interaction among various actors; c) the traditional boundaries between processes, goods and services can no longer be taken for granted as they change their nature in a fluid and dynamic way.

³⁸ In a sense, this is a concise definition of an innovation ecosystem as described in the open innovation literature like Chesbrough (2003, 2007). A critical review of the concept can be found in Oh *et al.* (2016).

³⁹ How value co-creation processes are affected by the introduction of new digital technologies is also a relevant issue to be addressed. See Kagermann, 2015.

A rich literature (Barrett *et al.*, 2015), including a range of country- and sector-specific case studies, is already available as a basis for the development of a new, digitally-conscious, innovation measurement framework. Overall, awareness should be raised among statisticians that these new research questions⁴⁰ will necessarily entail a further development work to complement the current OM framework.

CONCLUSIONS

By looking at the changes introduced over time in the OM's key concepts and definitions, an evolution process can be barely identified. The OM 2018 has critically revised some advancements achieved in the previous editions, like that of interpreting innovation as the process of delivering something new and also valuable, by going back to the straightforward view that, as far as products are concerned, any new product is an innovation by definition. Another example is the reference definition of innovation becoming broader – i.e. "to make something new available to users" – while leaving the question of qualifying the real value of the innovation introduced unanswered.

It should also be noted that some recent developments in the economic and management literature are totally – SDL, servitization – or partially – open innovation, business model innovation – neglected in the OM 2018.

Of course, as to its inner nature of statistical manual, the OM 2018 will have to be evaluated according to its effectiveness and ability to provide a set of tools for improving innovation statistics at international level and, most importantly, to make them relevant to researchers and policy makers.

In this respect, three points need to be highlighted. First, the choice of ensuring an almost total continuity with the statistical practices prescribed by the OM 2005 should be mitigated by adopting a more flexible approach in the design of innovation surveys.

⁴⁰ A demand for specific indicators already exists also about definite digital phenomena like digital platforms; see de Reuver 2018.

There is a growing demand for new indicators and for exploring new innovation behaviors; statisticians should keep testing new questions and new indicators. Second, as innovation is more than ever a multi-faceted phenomenon, new surveys should be developed to explore firms' strategies (with reference, for instance, to their intangible assets), new business models (e.g. digital platforms) and the innovation impact at economic and social level (starting from evidences of value co-creation). Third, the request for more information on the effects of the digital transformation should convince statisticians to review some basic classifications (like that on economic activities, ISIC) or statistical definitions (chiefly, that of *enterprise*) to adapt them to the changes taking place in the real world.

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