Capturing and Measuring quality and productivity in healthcare service systems

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Due to medical and technical progress as well as the on-going demographic shift, the healthcare sector has become an increasingly important part of our economy. As a consequence, the healthcare services’ quality and efficiency receive broader attention. However, interfering objectives such as the patient’s well-being and economic targets pose major challenges to a clear definition of as well as measuring service quality and productivity. This paper provides an insight in current research activities on productivity in healthcare service systems. Additionally, the authors present an approach for systematic measurement of service quality and productivity in the healthcare.

1. Introduction

The importance of the healthcare sector has increased in recent years because of a medical and technical progress as well as the increasing demographic shift in western society. This shift implicates a broader attention on the quality and efficiency with which healthcare services are delivered. As a consequence this situation raises major challenges to defining and measuring service quality and productivity, due to interfering objectives such as the patient’s well-being and economic targets. As the perceived quality is known as a subjective customer-driven measure (Cronin; Taylor, 1992), even productivity in services cannot be measured without capturing the influencing factors from a client’s or patient’s perspective. However, the manifestation of diseases varies among patients compelling healthcare service providers to be flexible enough to adapt the predefined processes (as they are set e.g. by clinical pathways) in order to sustain or improve service quality and productivity to the individual case. Therefore, whereas the measurement of quality and gained productivity is well-defined in a manufacturing context, a lack of such measures for (healthcare) services is evident (Grönroos; Ojasalo, 2004).

Quality measurement involves high complexity as the healthcare sector is highly regulated, thus comparing e.g. value for money of the service rendered might not be an appropriate signal for quality (Tirole, 1988). Moreover, patients are typically not able to assess and compare the quality of the medical treatments they receive caused by missing expertise and an inability to relate the healthcare result with the treatment received (Ting et al., 2009).

Today’s healthcare processes are performed by a variety of different service providers, who generally act independently and with divergent objectives. These processes range from rescue service to acute and inpatient treatment, rehabilitation, outpatient treatment, and nursing care. Following the service-oriented point of view of Vargo and Lusch, a service can be seen as the “application of competences [...] through
deeds, processes and performance for the benefit of another entity or the entity itself" (Vargo; Lusch, 2004). This definition implies two different messages. First, it stresses the importance of information, knowledge and competencies as the operant resources for the application and the jointly accomplishment of the service(s). Second, the understanding of the value-creation through the application of a service is also emphasized. With the service-dominant logic the traditional thinking of a one-way one-time transaction between a provider and a customer or patient, respectively, is overridden. This implicates that the traditional notion of productivity as the ratio of output and input factors does not account for the complexity that is raised by these collaborations of multiple actors by which healthcare services can be characterized. These multiple actors form a so-called service system (Spohrer et al. 2007) in which each actor contributes tangible and intangible resources to a value co-creation process. Therefore productivity indicators need to embrace a systems view. By integrating all the involved parties into measuring the received service quality and the productivity of their performance, a common understanding of service productivity and quality is needed.

In western countries, stroke is the third leading cause of death (Mackay; Mensah, 2004) and it is an archetype of a chronic disease leaving the major burden on ambulatory care (Barzel et al. 2008). About 40% the stroke survivors are left disabled (Seffrin et al. 2007) decreasing their employability while increasing societal healthcare costs. The societal costs associated with stroke care are estimated by 7.1 billion Euro today and considering demographic shifts in 2025 about 108.6 billion in Germany (Kolominsky-Rabas et al., 2006). Therefore, the authors will focus on quality and productivity in the German stroke care. This paper gives an overview of healthcare service systems' challenges and peculiarities. Furthermore, the main criteria of current metrics in healthcare service systems will be discussed.

2. Quality and productivity in healthcare service systems

Concept of Service Systems

A linked perspective of the involved parties helps to examine the quality and productivity related challenges in the healthcare sector. The definition of the construct 'service system' was first introduced by Spohrer and Maglio. They view service systems as a "value-cocreation configuration" (Spohrer et al., 2008) of "people, technology, other internal and external service systems and [...] information" (Spohrer et al., 2007). Building upon this definition, a service system is a special type of an open, dynamic system (Spohrer et al., 2008) in which further service systems interact using various resources to co-create value for achieving certain objectives. Thus, service systems are actors themselves. The smallest conceivable service system is a single person e.g. a patient or a doctor. Larger service systems emerge through interaction among service systems.

In the case of healthcare, medical staff - as smallest possible service system - interact to create a larger acting service system such as a ward – whereas interacting wards form a hospital. Even one of the foundational premises of Vargo and Lusch (Vargo; Lusch, 2004, FP5) underpins this statement, since it says that all kinds of enterprises and organizations, as players in the economy, can be perceived as service system.
Capturing Service Quality

Service provisioning typically follows the three dimensions of (1) setting up the necessary potential, (2) starting the service delivery process by the external factor and (3) the timeframe in which the service outcome results (see among others Corsten, 1985; Meyer, 1998; and Hilke, 1989). But how to measure the quality of the service provided regarding its specifics mentioned in the introduction, e.g. high costs do not guarantee high quality? Whereas in terms of goods defining and measuring ‘quality’ has a long history (e.g. Garvin, 1983), there is still disagreement regarding the specification of ‘service quality’ (Bruhn, 2008). Generally, service quality can be described as the degree to which goals for single facets of the service are met in service provisioning. This gaps emerge for instance due to the differences between consumer’s expectations and perceptions of service quality and the provider’s tasks associated with service delivery to consumers (Parasuram et al., 1985). In opposition to quality of goods, service quality cannot be based exclusively on the service outcome. Moreover, service quality should be related to the three service dimensions mentioned above and broken down to potential quality, process quality and outcome quality. This quality concept refers to Donabedian (Donabedian, 1980), who divided service quality into the following three dimensions based on the example of medical care:

- Structural quality refers to quality issues of the structural preconditions. This can be resources like human labor, materials, technology of information.
- Process quality means the manner of service provisioning and includes individual measures within core and sub processes.
- Outcome quality indicates the results and typically comprises indicators such as customer satisfaction, in order to address any of the stakeholder interests of the service provider.

Regarding existing service quality models, the measurement of service quality depends on different factors such as type of service setting, situation, time and need (Seth; Deshmukh, 2005). As mentioned above, measuring quality in healthcare is peculiar as a market price as signal for the carried out service quality typically does not exist. In general, “quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (Lohr, 1990). More precisely, quality of health care should be measured as used in clinical medicine (Chassin et al., 1998). Referring to productivity, quality can be seen as one of the two output dimensions quality and quantity (Fleßa, 2010).

Measuring Service Productivity

The traditional definition of productivity originates from a manufacturing context in which the production of tangible goods fills a dominant role. Hence, productivity is quantified by the output of a transformation process per unit of input, which can be described by the ratio of the two measures. However, the output and input measures from a manufacturing context cannot be simply transformed to the healthcare setting. The notion has to be slightly modified to fit the context of healthcare services. Hence, the service provided is seen as a process in which input factors are transformed to output value. On the input side, we need to account for the diversity and intangibility of input that comes from various participating actors. We segment and describe the pertinent types of input in the next section. The output of the transfor-
The information process is also intangible and additionally volatile. It depends on the alignment of the different goals the actors pursue.

Therefore, the quality and productivity of services in the health care sector requires special definitions and considerations.

3. Requirements for identifying metrics

In order to provide a framework for measuring the productivity in healthcare service systems and associated with the quality, suitable metrics have to be identified by considering specifics of the sector as well as of the constructs of service quality and service productivity mentioned on the previous section. The concept of service-systems, as it was described before, helps to understand interaction processes and the interlinkage of involved parties. Based on this knowledge about interdependencies the authors chose suitable criteria in order to identify metrics for capturing service quality and productivity.

With respect to service quality, we define requirements that healthcare quality indicators have to meet on a general level first and then analyze the applicability of possible measures in more detail verifying it by expert interviews based on a specific case scenario. Although quality assurance gains importance within healthcare, its measurement is difficult and limited (Stillger; Misselwitz, 2001). This is due to deficits of research in evaluation and suitable methods, amongst other things. As mentioned in the introduction, medical care is complex, interlinked, and does not follow a standard process, which is caused by the individuality of patients, differing frequency of quality indicators, delay between medical care consumption and the possibility of measuring its effects and non-standardized documentation policies. According to Rubin (Rubin et al., 2001) general healthcare quality measures need to possess the following properties: measurability, feasibility, comparability, acceptability and therefore existing measures which comply with criteria such as reliability and validity in the individual community. Moreover, suitable quality measures need to consider specifics of the three quality dimensions. According to the literature, e.g. Campell (Campell et al., 2000) and Donabedian (Donabedian, 1980), we defined the three quality dimensions and built suitable metrics (Müller-Gorchs et al., 2010), which can be captured by subjective and objective parameters (Schwartz et al., 2003). Outcome quality is related to the health status of patients. In case of stroke, standardized neurological scales as NIHSS (Williams et al., 2000) facilitate measuring the patients’ neurological status. The so called lysis rate can be applied if the patient arrives within a narrow time slot at hospital. These metrics are suitable retrospective indicators for the outcome quality. For measuring process quality, which is related to actual care given, the preclinical and clinical process time, e.g. arriving time at hospital, run time CT, discharge, was identified as a significant indicator. As medical services are mainly produced by human service personnel, it is suitable to measure the structure quality (referring to the organizational factors) by means of personnel’s satisfaction as well as learning effects and user acceptance.

For identifying metrics to estimate the productivity of a health care service in stroke care the input factors and the results of the transformation process (output value) have to be defined. Input factors, which comprise the resources of the involved service systems used in a transformation process, can be separated in work, capital
equipment and materials. In the provision of health services, inputs are working hours of medical and non-medical staff (work), buildings and equipment used (capital equipment) and medication, electricity and other resources purchased (materials) (OECD, 2003). Services require an additional “external factor” for co-creation, which is represented by the patient in the health care sector (Alter, 1999). Moreover, information as the basis for interaction of service systems is also input factor in the provision of health services, which has to be considered (Seelos, 1994) in productivity calculations. Input factors in medical care processes are known but the exact estimation in this use case, the stroke care service, has to be defined. Whereas in the production of material goods, the number and quality of products demonstrate the main output, in healthcare the main output value is the service provision and knowledge (Fleßa, 2010). The term “output” does not seem appropriate for the final result of a health service provision process. According to Fleßa (Fleßa, 2010) output can be transformed by the input factor patient into a more subjective form of result, the “outcome”. In our point of view output and outcome can be observed separately. Output is a quantitative measurement of the transformation results whereas outcome a subject-driven quantitative result describes. Examples for outcome in health services are health status, quality of life or satisfaction. The sum of individual outcomes considered in a superior way, like an economy, is named “impact”. It has to be mentioned that there is no consistent use of these terms. To determine the “results” of the health service provision, it has to be defined if output or outcome should be applied or a combination of both. If it is aimed to find a combination, the kind of aggregation has to be declared. The evaluation of “impact” is not considered by this work to ensure to stay on a concrete level in the use of stroke care. Additionally, the “production results” can be classified into different fields. These fields are: sector-specific results - which are in the stroke care, medical “results” and service-specific results-, economic results and player-specific results. For the definition of productivity metrics it has to be considered that different focus groups represented by service systems in the health care sector have various aims and interests and the output in one service system is not necessarily identic to another group or service system (OECD, 2003). It has to be identified if such a sub-grouping is relevant in the estimation of productivity. Possible subgroups in health care include: care provider (e.g. hospitals, outpatient physicians), recipient of benefit (patients) and reimbursing institutions (e.g. health insurance companies and pension fund). The main actor of the productivity measurement in stroke care is the care provider, which has an important influence on the service production. The recipient of benefit is the close second, as a co-producer of the service itself. In the analysis it is assumed that the reimbursing institutions provide the general conditions for producing health services in stroke care and are excluded from further productivity considerations.

4. Discussion

When approaching an estimate of healthcare services’ quality and productivity, different sectors of the healthcare system have to be considered. For example the acute and post-acute stroke care processes in Germany include rescue by an emergency doctor and a rescue service, acute and inpatient treatment, the rehabilitation and after care, and sometimes an inevitable inpatient or outpatient care by nursing care institutions. All of these service systems contribute to the value co-creation with the patient. Therefore, a multi-dimensional measurement approach is required to
measure the stroke-related health service provision. Within this paper we slightly discussed the productivity dimensions of output and outcome, but there is some deeper research on that topic necessary, to answer all the raised questions and educe solutions transferable to the healthcare sector. Moreover, there is still work missing by identifying synergistic effects, differentiations and interferences of quality and productivity metrics. Among other things it is still important to be aware of the service-systems’ interconnectedness: If the examination is cross-sectoral or not, this has to be considered in the selection of metrics.

As next steps, the authors will provide a target model for the measurement of service quality and productivity in the healthcare sector, which will be based on the example of cross-sectoral stroke care. This model will then be evaluated among others through expert workshops with representatives from the healthcare practice. Since the healthcare domain consists of various facets, our evaluation of healthcare service systems’ quality and productivity will be performed exemplarily on the case of stroke care.
5. References


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