Achieving Innovation in Healthcare - *the public quasi-market paradox*

Sofia Wagrell
STS centre
Department of Business Administration
Uppsala University

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During the past century people in Western society have grown constantly older, due to the continuous advancement within medicine enabling this advantageous evolvement. Even if it is a positive development of health and well-being among citizens, it is not for free. The public sector in most OECD countries is struggling with budget deficits, not least in the healthcare sector because it is expensive to cure diseases and to keep people alive longer. Furthermore, there are many actors involved in this unremitting battle to "save" healthcare from deficits and help the sector as whole to evolve. Actors vary from policymakers to companies and venture capitalists although the fact still remains that healthcare has to be paid for.

The burgeoning problems of high treatment costs are on the one hand trying to be solved by medical technology companies that constantly provide new high tech treatment methods to the healthcare providers. On the other, politicians are trying to solve the cost problem by rationalizing production of healthcare services through higher efficiency and productivity plans whereby new technology is stated to play a decisive role. However, it is important to acknowledge the many actors working towards the same goal; private business, policy and the healthcare organizations are together struggling to find more economic solutions to cure the ill.

Escalating costs in almost all OECD countries in the 1980's resulted in more extensive reforms in most countries' public sectors where market models and business-like structures were used as a template to enhance efficiency. The reform has been conceptually termed New Public Management (NPM). NPM can be described as an umbrella term for the shift from hierarchic structures in public sectors towards a market-oriented view, a shift primarily taking place because of claimed inefficiency in the "older system" (Pollitt et. al 2004, Hood 1995 pp.95, Sahlin-Andersson 2002, Christensen & Lægrid 2002, Almqvist 2006). Irrespective of the many diverse versions of underlying changes that might have caused the shift in the beginning of the 1990's it can however be concluded most countries encompassed by the NPM reform have undergone all-embracing changes in their public administration over the past 20 years (Pollitt & Bouckaert, 2000). Changes have been profound and have pushed the healthcare system towards expanded administration and rearrangements in national organization of public health services. Competition and slimmed production lines are increasingly important within this type of thinking (Pollit et al. 2004).

This paper brings about the problematic consequences of NPM incentives on new technology adaptation in the healthcare system. While new guidelines for healthcare governance, imposed by the NPM reform, indulges a system where new technology is stated to be central to its incentives – higher efficiency and productivity – it is possible to outline the rather clear

cut ways in which new orders in healthcare organizations actually tend lock out new technology rather than embedding it into the organization. The paper employs a case study of a new medical high-tech device to demonstrate the negative effects of NPM on technology adaptation in healthcare. The case is utilized as a springboard to point to the consequences of NPM in the interface between a high-tech innovation and the established resources in a healthcare organization driven by market efficiency logic.

Theoretical stances - studying innovation in healthcare from an interactive perspective

An interactive perspective does, in its most fundamental principles, state the opposite of a market view.
An interactive perspective suggests organizations have a high degree of cooperation rather than competition. (Waluszewski & Håkansson 2002, Snehota & Håkansson1995, Håkansson 1982 pp.11).
A bit simplified the interactive approach applied in this paper put focus on the ways in which resources interact and thereby investigates resources interconnectedness and embeddedness as well as clashes between resources.

Since the1970's empirical studies ranging over a large spectrum of diverse business fields has been undertaken by IMP scholars. These studies show how firms are organized in patterns of cooperation rather than the supposed fundamental cornerstone in classic economics, namely competition. Under the light of these IMP studies, the efficiency of a healthcare quasi-market construct needs to be questioned. Could it be more efficient to create an artificial market of healthcare when "the market" does not even seem to exist in its conceptually presumed "natural form"? Applying an interactive perspective in studying how new technology are embedded into healthcare organizations can however help to point to the barriers rules of a market concept creates on a) the already established resource structure in healthcare and b) the new resource/innovation trying to find spread use

Applying a traditional market view when addressing this problematic task (to achieve use) would imply to focus on the ways in which innovation takes place within organizational boarders. Prone to linearity the "traditional school" reckon innovation as transferable artefacts, i.e. anything but something taking place and being defined by interaction. An important aspect of achieving innovation in healthcare is to recognize the effect of regulations shaping the already established resources in the user settings as well as how these regulations are affecting possibilities to embed new technology.

This paper employs the 4R framework as a tool to deconstruct a case into resources. It is a way to capture the interfaces of resources and pursue the interplay between technology and established resources. Deconstructing means that processes and artefacts are broken down into resources and resource interfaces, which in a web of interconnections illustrate the complexity in technological content and how it tend to change in appearance and use depending on which other resources it is connected to (Latour, 1987). Because during construction and development of a technical artefact, social aspects as investor money, strategic/political decisions, interpretations by others and so forth are intertwined with purely technical artefacts and thus affecting the *ability to interact* and *the outcome of interaction*.

The 4R framework

A central stance in the interaction model is the one of resource heterogeneity, stating that the value of a resource is reciprocally created in combination with other resources (Penrose,

1959, Håkansson & Waluszewski 2002). Resources change their features or shape when adapting to each other which happens in interaction. The interdependence between resources emerges from the fact that they are *created* and *shaped* in the interaction processes. (Håkansson & Waluszewski, 2002 pp.33, Håkansson & Snehota 1995, Håkansson et. al. 2009) Furthermore, studying new technology implies a comprehension of the multiple levels in an organization in which the new technology has to be interconnected and adapt to.

The 4Rs framework includes four categories of resources; *products, facilities, organizational units* and *relationships*, where the first two are physical and the latter two are social (Håkansson & Waluszewski, 2002 pp.33).

Within traditional marketing theory *products* are often treated as given, something the customer choose to buy or not. Instead, from an interactive perspective the features of products are consequences of interaction between companies. Due to already established structures such as technical path dependencies, companies tend to create interdependencies when interacting with each other. The prerequisites in these network structures will in turn affect the features of products. Any kind of artefact can be considered a product; raw materials, components or end products ready for use. (Håkansson & Waluszewski, 2002 pp.35)

Facilities are a second type of physical resources referred to as for example production plants, research facilities and warehouses. In linking facilities to each other companies are able to save time and money and increase learning.

An *organizational unit* is a resource of social character referring to the knowledge, competence, organizational structure, routines and skills bound in an organization through its personnel (Håkansson & Waluszewski, 2000 pp.36). The continuous interaction with others within the same network affects content and skills and the ways it evolves over time and as an organizational unit. The ability to cooperate with its counterparts is a crucial interactive skill of the unit to handle.

Finally, *business relationships* are a special type of resources that to a larger degree are time-dependent, because of past and present interactions as well as expectations on future activities. A relationship is then a result of interaction between organizational units over time (Håkansson & Waluszewski, 2002 pp.37). Relationships tend to appear differently and vary in both disposition and content. They can be defined as "thick" in sense where a relationship contains many levels of cooperation such as knowledge exchange, integrated production, product development or utilizing the same facilities. Relationships can on the other end be more transactional, showing a low degree of cooperation thus an exchange with low degree of complexity.

Analytically the interplay between resources takes place on three levels: *economical, technical* and *social* where the social level refers to skills and knowledge bound to a resource (Baraldi, 2003). The investigation of the diverse levels of interaction between resources assigns a certain impact to *resource interfaces* (Håkansson &Waluszewski, 2002 pp.199-212). In order to comprehend how resources are connected and interact implies a closer scrutiny of the single resource interface. Three diverse categories of interfaces are identified (Baraldi & Strömsten 2006, Baraldi, Gressetvol, Harrison, 2011);

Social interfaces – interaction of resources of social character, business units and business

relationships.
Physical/technical interfaces – interaction between resources of technical/physical character, namely products and facilities.
Mixed interfaces – interaction between a resource of social charter and a physical/technical resource.

In short the 4R model investigates how the value of a resource is affected when combined with other resources, both within and outside an organizational boarders. Thus of great magnitude is not only the resource it self, but rather the content of what is in-between resources. Scrutinizing the interfaces provides the knowledge as to why a resource is enabled to connect to certain resources and then the ways it clashes with others. Interfaces are thereby able to distinguish the consequences diverse resource combinations create on surrounding resources (Baraldi 2003).

Idea structure

This paper does put emphasis on the idea structure (Håkansson & Waluszewski 2002 pp.72-75). The idea structure is best described in relation to an activated structure, where ideas are represented by past, present and future actions, while the activated structure correspond to actions taking place here and also has a direct physical structure. Another aspect of the idea structure concerns the actors involved. It is not necessarily same actors represented in within the two structures, i.e. the creators of an idea structure do not necessarily take part of the activated structure (Håkansson &Waluszewski 2002 pp.74). The idea structure however shapes and set boundaries for how resources are able to interact in the activate structure.

Idea structures are further supposed to vary and change in content quite sudden while activated structures contrarily tend to be stable and change slowly over longer time periods. The difficulty of changes are to some degree explained by this inherited difference between the two, as put by Håkansson & Waluszewski (2007) "creating changes in the idea structure seems to be much easier than carrying them through in the physical structure" (Håkansson & Waluszewski 2002 pp.74). The reason for this is explained by the simplified representation of technology in the idea structure, which in turn is a consequence of the requirement for the technology to function within many diverse resource combinations in the activated structure. A vital keystone is the indirect relationship of the activated and the idea structure, i.e. ideas can never be directly translated into actions and there will always be divergences between the two (Håkansson & Waluszewski 2002 pp.74)

In the specific case presented in this paper 4R helps to shed light on how the technical resource affects the already established structure and the many diverse demands an established structure will have on a new resource claiming its place among other resources in a user setting. The main purpose for unfolding the interfaces in the case below is to show how the idea structure influences the prerequisites for interaction and in the ways it alters the interfaces. Hence, the consequences a traditional market posture has on technological embedding in healthcare.

Methodology

The empirical study of the new technological method have encompassed a collection of empirical data concerning the company ProstaLund, their technical development of the PLFT method as well as data collection concerning traditional surgery method TURP. The two methods technological and organizational interfaces have been under scrutiny. Data collection has been undertaken at Lund University hospital in all managerial levels to grasp how

political commissions are translated in practice and their impact on resources in the direct user interfaces. Besides taking part of scientific publications and company material, interviews have been carried out with a) respondents within the producing company, b) respondents representing the medical users in the private and public healthcare sector and c) respondents representing the purchasing and accounting systems in the private and public healthcare sector. In total 16 interviews have been carried out in this study. Furthermore, participating observations (Saunders et al. 1997:190) of the interactions between the focal technology and method, medical staff and patients have been undertaken as well.

The new role of medical technology in Swedish healthcare

In the early 1990's the reform "New Public Management" swept over western society to change prerequisites for public organization and administration. NPM is however an umbrella term for a range of governmental reforms assuming diverse shapes dependent on country and socioeconomic rudiments. Despite the many diverse versions of NPM there are common traits to be assumed as well. Foremost the NPM reform reversed previous doctrines in the earlier bureaucratic systems, such as a shift from orderly hierarchies towards flat organizational structures applying administrative tools derived from private business settings (Pollitt et. al 2004, Hood 1995). The aim with the new take on administration was foremost to achieve higher efficiency in public institutions that seemed to have continuously escalating budget deficits. According to a traditional view of the market, efficiency problems can be identified as lack of coordination and a lack of incentives "to do better" among public organizations. Consequently, introducing public organizations to competition, the appearing market was assumed to solve the burgeoning inefficiency problems without any larger need of interference, just as it is supposed to do in a private business setting. Thus the market approach is providing a rationalistic logic, where competition is held central and therefore, creating a healthcare market supposedly equal to any traditional private business setting (Almquist 2006, Forsell 1999)

Narrowing down the perspective to Swedish healthcare; Sweden has chosen a low degree of privatization in favour for a comprehensive decentralization reform (Pollitt & Bouckhaert, 2004). Most other countries comprised by the reform, like Great Britain and France rather have a tendency towards a high degree of privatisation thus major part of public administration is centrally governed. It underlines the fact that Sweden has developed a pattern in healthcare administration not in line with other countries that have embraced the NPM reform (Pollitt et al. 2009, Siverbo 2004, Premfors 1989).

Two of the most common models are the "purchaser- provider" and "customer choice" models. The purchaser-provider offers a decentralized scenario; a county is divided into smaller self-governed entities. The purchasers' incentive is to monitor the providing organization indirectly through "specific demands". The supposed mechanism is to adjust production of healthcare through a yearly established, but not coercive, demand. The providing organization has to adjust their production according to the purchasing entity's[1] demands. The "specific demands" are derived from estimations on healthcare needs within the population in the specific district. The model is supposed to affect the producing institution into a more productive direction as well as to become more efficient through reorganizing healthcare activities after actual needs within the population. The purchaser-provider model was one of the most commonly applied models in Swedish healthcare in early 2000. It was however gradually abandoned in favour for another model called *customer*

[1] The purchasing entity is a publicly ran unit

choice. The incentive to apply the customer choice model over purchase-provider is that it offers a better instrument for politicians to monitor health services since decision-making is centralized. The model provides a free option for citizens within a region to choose from a range of care providers, from private to publicly run institutions. The demand is thereby supposed to regulate amount of providers. A central governmental institution in the county decides on the basic commission for the county and reimbursement levels for different types of provided care. The four common overarching types of refunding are however

1) A fixed, predefined sum for all listed patients[2]
2) Goal oriented refunding - to not exceed predefined levels of expenditure
3) Performance achievement – diverse grading systems which are defined in the basic commission
4) Special refunding – all care that not made part of the basic commission falls under this category

The categories are divided into smaller units to better define reimbursement and refunding. Commonly the units are paid on a monthly basis with possibility to receive bonus each year if the unit has reached its goals. (Cederholm 2010, Rasmussen & Permsjö 2009)

Interesting is however how new technology is represented within these models, independent of which version is applied. Unrelated to the models specific outline they rest on common grounds presuming rationalistic market thinking. Healthcare organizations put large emphasis to rationalize the production of healthcare through *new technology*. High tech innovations are at least claimed to play a decisive role as a tool of rationalization in the production of healthcare (Vinsa 2007, Surkuula 2007, Ekbäck 2006). It is assumed to make interventions run smoother and make procedures more patient friendly and cost efficient still it is regarded as an exogenous factor to productivity or efficiency.

Applying the models described above to achieve efficient production of healthcare services is to compare it to any service in a fair marketplace. In such postulation new technology has yet a second important role within the market logic driven organization; as a tool of competition. New high tech devices are used to compete over patients although mostly outside county boarders. The Swedish government has decentralized public healthcare to create competition, hence to achieve higher efficiency. The independent units (read counties/regions) are in this way able to compete with each other, thus creating a national market of healthcare. Larger counties and regions providing specialized healthcare are further contracting smaller counties lacking specialized services. Larger hospitals able to provide the latest technology are thereby highly competitive on this "national market of healthcare".

New technology in healthcare has, through market endeavours, become a pivotal component in the struggle for productivity and efficiency in healthcare services. Nevertheless, to be acknowledged is the role of new technology, in an idea-level here, it is still an exogenous variable to the productivity concept. Following sections describes a new medical high-tech device treating the common disease, Benign Prostatic Enlargement, abbreviated BPH[3].

TUMT – Trans Urethral Micro Thermo therapy – minimal invasive treatment for the common disease BPH

[2] In Sweden it is a common system in primary care; citizens are required to get listed at specific healthcare centres, but are free to choose from any available provider.

[3] Benign prostatic Hyperplasia

The high impact of new technology within the market driven organization of healthcare is a fact, the technology in this specific case was introduced to Swedish healthcare in the cradle of the NPM reforms. New rationalistic thinking and larger budget deficit was however often the trigger to introduce new minimal invasive technology, often as an alternative to invasive surgery which is associated with high costs and higher risks for patients (Pedersen 2006, Malmberg 2010, Bolmsjö 2007, Flensburg 2007).

BPH is a benign enlargement of the prostate. The prostate is a gland located just underneath the urine bladder enclosing urethra. This small gland is growing throughout a lifetime even if growth slow down by age. BPH indicates the benign form of growth, even though benign it still causes difficulties or obstruction to urinate and in some cases impotence. It is a common disease with an estimated prevalence of 60-80% in all men past 50 years of age thereby qualifying into the category of diseases where higher efficiency in treatment will show economical effects in the health care sector. (Wagrell 2000 p. 7, pp.15; Schelin 2006 pp. 18)

In the late 1980's there were few options of medication at hand to cure BPH, if compared with today's range of medication. Surgical treatment of BPH had already in 1988 made great progress from invasive surgery through an open incision, *Open Prostatectomy*, to become a minimal invasive surgical method through laparoscopy or keyhole surgery, a method named TURP, *Transurethral Resection of the Prostate*. TURP is still in 2010 the "gold standard" treatment in BPH active therapy and is considered as *"The handicraft"* of urologists. (Wagrell 2000, pp.12, 13; Schelin 2006, pp. 24, 25).

The surgical treatment TURP is an efficient method showing 75% full recovery in treated patients. A negative aspect with invasive surgery is that most patients suffering from BPH troubles are rather old, risks of surgery increase with high age. Some patients do not suffer signifacantly from their enlarged prostate but could still gain from treatment nonetheless because of the risk for an enlarged prostate to develop into cancer (Schelin 2006 pp. 23; Wagrell 2010; Wagrell 2000 pp. 13).

Microwave treatment destroys organic tissue through heat produced under irradiation. Microwaves make tissue wither leaving the bladder and urethra with a normal urinal flow. A simplified description of TUMT treatment is that tissue wither under the heat produced by irradiation. High temperatures destroy excessive tissue and size of the prostate is reduced. Since no tissue is physically removed, microwave treatment creates parts of necrosis in the gland extending the healing process in microwave treatment in comparison to surgical treatment where tissue is physically removed. But even if prolonged, the healing process is more merciful in the sense patients are normally allowed back at work within a day or two after undergone treatment (Schelin 2010; Wagrell 2007; Wagrell 2000 pp. 13)

The common name of microwave technology was TUMT -*Trans Urethral Micro Thermotherapy* and it was the buzzed-about technology in BPH treatment in the early 1990's since it offered a treatment without surgery and was performed in outpatient clinics. The fact that surgery was no longer necessary and anaesthesia and hospitalization thereby was avoided, microwave treatment was gentler to already ill or weak patients compared to surgery. The patient-friendliness and the fact that patients were allowed to leave the hospital only a few hours after treatment was a great advantage, from both patient and economic point of view.

Another beneficial aspect of TUMT was the liberated surgery hours in the surgical premises, which were under relentless pressure. Except for the savings in anaesthesia and post surgery care the capacity of surgical premises was liberated. When TUMT was first introduced, microwave treatment appeared to be a very promising successor of the laparoscopic surgical method, TURP. Being able to challenge the old handicraft of TURP, with promising economical benefits and on top offering a more patient friendly treatment, TUMT had to be an advantageous investment. (Malmberg 2010, Bolmsjö 2006, Wagrell 2007, Pedersen 2007)

TUMT was fast adopted in Sweden in the beginning of 1990 when the economic pressure had become evident to clinical managers and chief physicians finding them self in a new position where their responsibilities had been extended to not only concern medical issues but economical responsibility as well. At the time being it was a fair turn in how to handle activities under new order.

The problem with TUMT turned out to be it was too standardized of a treatment, 60 W for 60 minutes in all patients no matter of prior symptoms or the varying degree of implications. It was a kind of "plug and play" easy fix method. The bitter aftertaste of too highly standardized treatment was poor treatment results why TUMT machines were abandoned in mid 1990's and almost all producers went out of business, all but one small Swedish TUMT producer called ProstaLund. (Bolmsjö 2007, Schelin 2010)

ProstaLund

ProstaLund was a small TUMT producer starting their production of microwave machines in early 1990 through a development project with a urology clinic in Sweden. The small technology consultancy firm didn't back then, when initiating the project, plan on becoming a TUMT producer but as development proceeded customers came with orders and a company evolved. After five years of rather good sales between 1990-1995 they hit rock bottom as all other TUMT producers in Europe. TUMT showed poor results in treatment and fast earned a reputation and use was alsomst nonexistent. ProstaLund was about to go out of business when they were financially subsidised by governmental innovation funds. The fundraisers were more or less implored them to not go out of business but to consider to further develop their technology, which they did in the end.

It resulted in a new individualized technology named PLFT, using microwave technology as well but in all other senses it was a new method and a new machine. Treatment results were now equal to those of surgery, still with the benefits of the old TUMT, i.e. no surgical intervention or anaesthesia needed. To enable the development of the technology PLFT and a production process economic enough to allow commercial sales of the product, ProstaLund acquired venture capital, despite their small-scale production at the time. (Bolmsjö 2005, Pancarz 2005)

PLFT was proven more economic and more patient friendly than existing methods in three independent clinical dissertations. The company received support from public funds, as well as a continuous stream of venture capital, over many years to develop and sell their product. More than ten years after PLFT first was launched ProstaLund changed owners numerous times and more than 300 million SEK were invested in the company during a 15 years period. Even if ProstaLund are still in business in 2010, the company has experienced large difficulties to find spread use i.e. earn money to keep the company in business.

To understand why PLFT technology had such problems to become embedded into a using structure there is a need to examine the users settings. For this paper one specific setting is chosen, one of the principal university hospitals in Sweden, located in one of the largest counties called Region Skåne.

Lund University hospital – Use of microwaves in BPH treatment

The hospital is located in a university city in the southern parts of Sweden, a city called Lund, which is the same city as the company ProstaLund was founded. The urology clinic at Lund University Hospital was large and all encompassing regarding healthcare service, from basic to highly specialized in most fields. Until 2010 when the hospital was inactivated (geographically speaking) due to a merger of all the hospitals in the region. Former specialties do from 2010 exist as large entities only available at one hospital in the county, a version of large-scale production of healthcare services.

Anyhow, focus is set to before 2010, beginning with the first acquisition of microwave technology in BPH treatment. Lund has a history of periodical active microwave use but was not first in the region to use microwave technology, TUMT, in the 1990's. Another smaller hospital within the region was first to adopt to the novelties. Aided by the social insurance office in 1991, the small hospital of Simrishamn acquired the method through *financial support.* The subsidy demonstrates the high believes in new technology present at the time among many actors. However, shortly after TUMT was brought into use at the urology clinic in Lund as well where approximately a hundred operations were performed over a period of two years after which they chose to abandon microwave treatment due to poor results (Malmberg 2010). When ProstaLund launched their new method, PLFT, around 1998, Lund University Hospital was an active partner through following up on results during development. After 1998 the PLFT method was used sporadically in Lund as in many other hospitals in Sweden at the time. (Malmberg 2010, Broström 2010, Bolmsjö 2005)

The reasons as to why PLFT was not used in any larger scale in Lund were many. For one, there was the conflicting interest between urologists training to become skilled surgeons on the one hand and to replace their handicraft with a technological device on the other. Close linked to this issue was the lack of opportunity to learn the treatment properly. (Malmberg 2010, Broström 2010) It is fair to claim the urologists at this specific clinic had followed the development of microwave technology since it was in its cradle, hence there was a well developed knowledge concerning the method at this clinic as well as personal and social bonds between employees at the company and urologists at the clinic (Malmberg 2010, Bolmsjö 2007).

Purchaser-provider model

The years 1998/99 Region Skåne implemented the purchaser - provider model. As a consequence of the purchaser-provider model the clinic's treatment directions for BPH were altered and it was decided all urologists should from 2001 be able to treat BPH with PLFT. From 2001 and ahead it was meant for PLFT to replace a larger part of surgical treatment to enhance efficiency. So what were the underlying political decisions to alter the therapeutic standards for BPH treatment in 2001?

Firstly there had been a large pressure on privatization ensuing healthcare in the county of Skåne. Politicians discussed microwave technology as specialized alternative for private healthcare, the purpose was to create a private clinic specialized in PLFT treatment. To

finance the project an equivalent sum of money had to be cut from the urology clinic's budget. (Malmberg 2010, Broström 2010)

The clinic decided to implement PLFT at its "full potential" to avoid cut downs in an already strained budget. To convince all urologists to treat with the method turned out a harder task than first imagined. Firstly because PLFT is not "just a technology" it is more to it, a method to learn. The fact that treatment was a bit more complicated than first comprehended made the learning process more complex and time consuming for the urologists than first expected. It turned out to be a hard task to find time to educate physicians without cutting down on other necessary activities, such as the urologists' other professional development. Many of the urologists were in a development phase where they were more into open surgery and felt that microwave treatment made them stagnate in their professional skills. It was not a successful implementation of the method in Lund. (Malmberg 2010, Malmberg 2010)

The clinic was obliged to treat with microwaves and did not find any other solution than to engage two nurses to manage PLFT treatment. The action plan of clinical testing and full implementation of PLFT came to an end where two nurses were in charge of all PLFT treatment. At the time being, it seemed as an optimal solution from many aspects, the two nurses were very skilled, had extensive training from working with the method for many years. Still in the end it turned out to be the organizational space that was most problematic to over-bridge. Release time and space in the nurses and urologists routines in order to schedule PLFT treatment on a regular basis was hard to achieve. (Broström 2010, Malmberg 2010).

Firstly it was a demand from the physicians' side having one urologist responsible for treatment, even if not performing it, even if not present during treatment, someone with medical responsibility had be available as well as taking professional responsibility, which couldn't be done by a nurse. Furthermore, it was not enough to have one urologist, occupied with other work at the clinic, standing as the only responsive physician over treatment. It was required to have one specific urologist committed only to PLFT treatment - without carrying through any other work. Accordingly, to release time for one nurse to treat with PLFT was one thing, to release time for one nurse *and* one physician and they were back to square one. (Broström 2010, Malmberg 2010).

PLFT is a good example of political purchaser incentive with unexpected outcome. In an all-encompassing report of the purchaser provider split in Skåne it was concluded that the organizational and structural effects policy had hoped for did not occur since the purchaser did not have mandate to make changes in organisational structures and production processes within the providing organization. The monitoring incentive of the purchaser-provider model did not have the impact on production processes as policy makers had hoped for (Pfeiler 2002).

The clinic had an out-patient office and a ward, but no surgical premises. The hospital has a central surgery department, which commonly is a bottleneck in the production of healthcare since it used by all departments competing over surgery hours. TURP surgery is considered a smaller procedure and was consequently moved to a smaller hospital within the region to raise efficiency. The outcome was that there was no active BPH treatment available at Lund hospital, these patients were sent away. (Malmberg 2010, Broström 2010).
If PLFT was to be brought into use at the clinic in Lund, it would;
a) Generate a new category of patients to treat
b) Demand rearrangement of work routines and resources

c) Not generate economical benefits for the clinic in Lund, only provide a relief patients for the smaller hospitals.

Lean production and the "Customer Choice model"

In 2006 new management was appointed at Lund University Hospital, the new management introduced "lean production" in 2006 (Christensen 2009). The new board of management was from 2006 pushing the idea that production of health care is driven by the same logic as production in any other organization within production industry. There was a full believe in the possibility to standardize healthcare. In fact the hospital manager proposes that healthcare rather shows a very high degree of standardized features (Christensen 2009).

The Introduction of lean healthcare at the departments brought process charts over activities to increase efficiency in all undertaken activities. All personnel are supposed to be an active part in the further development of already existing processes in order to make all processes even more efficient and to better fit into the organization (Broström 2010, Malmberg 2010, Christensen 2009).

Lean healthcare brought higher demands on joint production to enhance efficiency, which is demanding to uphold in a vastly decentralized organization. The purchaser-provider model was abandoned in favour for the "Customer Choice" with internal pricing and reimbursement for all providers of healthcare. It generated a new framework for planning, budget and activities. (Cederholm 2010, Pfeiler 2002, Rasmussen & Permsjö 2009)

Within the customer choice, large-scale production, standardization and slimmed processes are more outspoken compared to the purchaser-provider model. In region Skåne it has resulted in ambulating physicians performing their tasks at diverse hospitals within the region. Some physicians has expressed their concern in not being able to follow up on their patients, still it is claimed by management to be a very efficient system generating more healthcare for less money.

Consequences for PLFT in lean production are firstly the difficulties to fit in which, is due to, the earlier mentioned, sporadic flow of patients. Even if nurses are able to make changes in their schedule, for few patients to receive treatment, the fact that physicians do not have any possibility to make time in their schedule is an impediment for the technology to become embedded. According to nurse Eva Broström, since 2009 also head at the clinic, it is of vast significance to have urologists confirming the method, which, they do by using it. If they do not use it, interest is automatically low and PLFT will never become part of standard treatment options for BPH. This incapability - due to lack of opportunity - to treat with PLFT has a direct diagnostic implication; patients are seldom on referral for PLFT even if symptoms potentially would be classified as suitable for PLFT treatment. The few patients that actually are on referral to receive PLFT normally belong to a category of patients suffering from other illnesses aggravating the conditions for a surgical procedure to succeed. If only the oldest and most ill are sent to treatment with PLFT it impairs the overall treatment results for PLFT diminishing the technology's chances to become part of standard treatment. Another aspect is that these patients are already classified as high-risk. They are either too ill, too old or suffering from other severe conditions implicating any treatment would leap a higher risk to fail. (Broström 2010, Rosén 2009)

Quality Control & PLFT

Quality of treatment processes is extensively controlled by rules within a market driven system. Control and transparency becomes more important since providers of care are both public and private, control systems work as a quality guarantee. More important than the professions knowledge and control are thus the national reports by SBU[4] and quality registers[5] (Waks & Levay 2006).

At the urology clinic in Lund physicians state they always bring SBU evaluations into consideration during methodology discussions, if a method is not SBU approved it is normally not considered.

SBU on the other hand only evaluates technologies already in widespread use. PLFT has not been considered for an SBU evaluation (Malmberg 2010, Rosén 2009, Wagrell 2007). Quality registers are documentations by physicians, where data as patients' symptoms, treatment and outcome of treatment are registered. The register is used as a best practice tool for physicians (Waks & Levay 2006). Since most of the patients treated with PLFT are as stated before often very old or ill and unable to undergo surgery, the treatment results shown in the quality registers are not helpful in achieving widespread use and become accepted. (Broström 2010)

Reimbursement & PLFT

Diagnose Related Groups DRG is one of the most common ways to grade healthcare in order to achieve reimbursement. Grading is further attained through a point system as an example; if a normal birth without complications are 0.8 points in resource consumption, whereas a birth where complications arise will generate 1,3 points they are together creating a median level of 1,0 points for a natural birth. 1.0 points will then be standard grading of resource consumption of a natural birth.

Basically treatments are categorized into diagnostic groups instead of being evaluated by disease, origin or body area. Significant for group belonging in DRG is rather the amount of resources required in treatment, regardless of their medical categorization. (Frommegård 2007).

DRG has become a tool to monitor healthcare, it is utilized as a prospective reimbursement system, where physicians are able to receive compensation for performed care services in a more flexible manner, than offered by traditional statistics. It is prospective since it offers preset categories each with specific amount of points for each resource. DRG further divides all treatments into resources. All resources have diverse weights for each disease making DRG a flexible prospective reimbursement. Since politicians decide upon weights it has yet another dimension, it is embraced as a useful reimbursement tool, it also enables politicians to monitor how physicians will treat their patients through this point system. DRG is used in Lund, where the different weights within the tool of DRG is decided within the frames of the "basic commission" set by politicians in the region.

DRG was initially designed as a describing tool to distinguish differences in resource consumption. Since DRG could offer a comprehensive picture of actual resources used in each specific case, it fast turned into a compensatory system. It is used to measure clinics' resource consumption for different treatments and work as a basis in pricing healthcare. Primary it is used in institutional care where 0,1 points equals a fixed amount of money.

[4] SBU is the governmental institution evaluating healthcare technologies

[5] Quality registers exists on a national level they are created by physicians for physicians in order to learn from each other and to enable a continuous improvement of healthcare services.

However is DRG foremost used in institutional care, not in primary care. PLFT is a non-institutional treatment method hence it is performed in outpatient offices, the alternative to PLFT, the surgical treatment TURP is performed in surgical premises and falls under the category of institutional care. Thus, the two treatments fall under diverse reimbursement categories, why it is never possible to claim the economical benefits of one over the other. The costs for these two methods are separated on diverse accounts.

Evidence Based Medicine and PLFT

Evidence based medicine (EBM) derives from within the profession of physicians. It was developed by professionals for professionals to be used in practice as a framework. The main argument for implementing EBM was the call for general praxis among physicians in how to conduct their treatment of patients. Development of this tool started around 1992 and has since then gradually been developed to better respond to needs in healthcare praxis. One large problem arose when the more interfering public institutions, politicians and other monitoring organs in healthcare used EBM as a tool to monitor the profession of physicians (Hult 2006). It is somehow recognized as a paradox in the sense physicians are thought to have the collegial control of their work through documenting their expertise and creating a "best practice " tool as EBM. However this tool is not used only by professionals rather in 2010 the tool is more commonly utilized by external organs as a tool to control physicians. (Hult 2006)

In Lund EBM was stated as important in their everyday work and decisions over what methods to use and not. Since it is a University hospital they do bring in new methods to test the accuracy and conduct clinical trials. Otherwise are all methods used at Lund UH evidence based methods.

PLFT has so far undertaken three dissertations of clinical studies, encompassing 300 hundred patients in long-term studies (10 years), but it is not considered evidence based method among urologists. EBM is not a clearly defined concept but exists as a representative for "best practice".

Analysis

The general models of purchaser-provider and customer-choice described above were implemented with good intentions, to raise efficiency and enhance productivity in the activated structure. The first model of purchaser-provider was abandoned due to too high degree of decentralization and thus too arduous to monitor for politicians. It clearly points to one fundamental paradox in the general NPM reform; the strive towards self-governance of smaller entities on the one hand while the centralized control is growing in the shape of a management explosion on the other (Almquist 2006). But how is this paradox interrelated to problems to embed the PLFT technology?

Firstly, in the customer-choice model county politicians and central management had more control and the smaller entities had less self-governance. To achieve control a range of "transparency tools" (Waks & Levay, 2006) were developed to keep politicians in control of healthcare providers, these tools are EBM, SBU, DRG and quality registers. These tools are understood as a form of idea structures trying to control the resources taken into use in the activated structure. In fact these tools, EBM; SBU etcetera in the idea structure were developed by physicians i.e. actors making part of the activated structure. But politicians "hijacked" the same tools to monitor and reimburse the activated structure. Hence, tools are

used to create an idea structure, to reimburse and monitor, instead of being describing tools for the profession.

The consequence of such conduct have resulted in a certain rigidity in the interpretation of the se tools, as in how to "relate to" and "keep within the frames". Economic goals based on fulfilments of EBM and quality registration of methods in use at clinics. The clinics have little, or no room, to make changes in the existing resource structure outside the frames of these tools. The rules consequently have a "locking effect" on the established resources since politicians does commonly not have the competence to judge treatment accuracy; they need the tools to do so. Since these tools, or idea structures are, as stated above, simplifications of how activities are undertaken in the activated structure – read treatment - and was initially evolved to guide and help physicians rather than providing an exact template, they are interpreted in many different ways.

As en example regarding PLFT and Evidence Based Medicine; PLFT have three independent dissertations, over 50 academic articles published on the accuracy of the method and an extensive range of long-term data, but is still not considered evidence based. Pointing to the vagueness in how the tools are applied and how to use it.

Another problem is the outcome of DRG weights – the smaller entities are dependent on patients choosing their clinic over others. Further clinics are dependent on the amount of and to what degree they are able to get reimbursed on an appropriate level for performed services. Institutionalized care is reimbursed with DRG, outpatient care is commonly reimbursed with statistics. The surgical method TURP falls under the category of institutionalized care and is reimbursed with DRG. PLFT is an outpatient treatment and does not even fall under the same category as the surgical treatment TURP. If there is no fair reimbursement in relation to the alternative method it will be difficult to recoup the benefits of the technology in relation to TURP. The providers are *dependent on reimbursement*, reimbursement level is decided through DRG, or statistics and weights, which in turn are settled by politicians and make part of the "basic commission". If a technology is not included in the reimbursement system it leaps high risk to not be taken into use within this system since it does not generate any viable income to the care provider.

The same argument can be made for all of these tools and as all idea structures they are object for interpretation. It quite well explains why PLFT does not have any problem to enter into the clinic as a research object but has large In property of research there is no need to interact with the control tools. The sporadic use of microwave technology observed at the clinic over time is explained by clinical studies of microwave technology undertaken at different times, more patients are treated with microwaves during a research project, when the project is finished use ceases.

The tools further come off well in standardized processes since it is easier to avoid misinterpretations. In the light of standardized processes and the "sporadic use" of PLFT, advocated by the urologists at the clinic, is lost; in a highly rigorous schedule there is no room for "sporadic".

In the purchaser –provider model the politicians adopted the part as purchasers and they ordered PLFT treatment. The problem with this order was they were not involved in how to solve the order, even if they at the same time were providers of financial means to follow through with this intent. It is a clear gap between orders from politicians and abilities of the

providing organization. The providers are self governed and the purchasers do not need to interfere or even care in how the providers are able to solve the commission or not. Which is not a normal scenario in any business relation and furthermore the providing entity does not have a realistic option a) continue as normal and we will cut your budget b) undertake PLFT treatment and your budget remains. However is it problematic that the clinic in Lund did not treat any PLFT patients, they were "outsourced" to a smaller hospital within the county. The purchasers do not make any distinction between institutionalized care or outpatient care or how the provider organizes their activities at all. Even if a well intended attempt, it points to the need for coordination between purchaser and provider.

TURP further has its own procedure or production line, performed in surgical department premises. Instruments used in this treatment are accounted for differently than for PLFT. PLFT becomes an additional cost for a clinic, while TURP most commonly is external to the clinics budget.

Conclusion

The case study in this paper illustrates a high-tech device development initially induced by NPM incentives, i.e. policy incentives to achieve innovation and economical growth. The basic commission in terms of idea structure does however from the company ProstaLund's perspective come about with double message; market pretensions on the one hand is supporting new technology in order to rationalize the system while on the other it is creating slimmed production lines and control tools preventing the technology to become embedded. The failure to implement this device was thereby rather surprising from both producer and user side.

Achieving innovation or the embedding of a new technology in a healthcare organization is as shown above not an easy task. The fact that healthcare is organized in a market-construct is somewhat problematic in the sense that the entities are not self-governed, they are monitored, a consequence is that the way resources are able to connect and interact are highly dependent on the monitoring tools.

The plausible lesson to learn is how constructs as a "quasi-market" have consequences for embedding innovation in healthcare. Even if hospitals have turned around their internal economy, that is only one side of the coin from a somewhat broader perspective. Slimmed production lines cut of possibilities to achieve spread use and for physicians to learn new methods.

Anyhow the question of efficiency gains remains, where are we looking for consequences? Inside the single hospital the numbers might be positive, but consequences for the surrounding companies and research is still not investigate thoroughly enough.

Hospitals are needed as platforms of knowledge-exchange and clinical research, something that is hard to achieve within the hospital organizations described above. The slimmed efficient healthcare organizations banishes new technology to interact with regulations derived from "transparency tools" rather than clinics and physicians.

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