

Factors Influencing Innovation in Healthcare: A conceptual synthesis

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ABSTRACT

This paper examines the factors driving innovation in the health sector. It specifically explores the factors that drive innovation in the National Health Service (NHS) United Kingdom. A literature review of innovation models and drivers for innovations in organizations was conducted. The secondary data were collected from various NHS publications on healthcare innovation. Data from secondary sources were reviewed and synthesised with the existing models in the literature. The findings show that there are several factors driving innovation in the health sector. In addition to other factors found in the literature, innovation is spurred through responses to the challenges of cost, supply chain problems and sustainability concerns. This implies that certain non-medical factors can influence the need for innovation in the health sector. A conceptual framework is developed to describe the factors influencing the need for innovation in the health sector.

Keywords: Innovation, Health Sector, Change, NHS

Introduction

Innovation has been a consistent feature of the private sector for a number of years. Likewise, studies into innovative practices in the public sector have increased during the last three decades. Despite this relatively broad period in which innovation has been discussed and studied, the way it emerges in the literature shows that more is left to be learnt. It is not surprising, therefore, to see the adoption of innovation arising in public debates and academic discussions. Innovation may mean different things to different people, professions and businesses (Mulgan and Albury 2003; Borins, 2001). Additionally, innovation will not perform its intended purpose in an organisation until appropriate building blocks are put in place. The ability to understand and leverage these factors determines the degree to which innovation can be disseminated within an organisation (Greenhalgh *et al.*, 2004). Some studies have been carried out to discover the barriers to innovation diffusion (Fitzgerald *et al.*, 2001; Leeman *et al.*, 2007). Innovation must be part of the organizational culture. It must be both encouraged and rewarded; this organizational “entrepreneurship” is very rare in highly centralized organizations.

The National Health Service (NHS) is the largest publicly funded healthcare system in Europe, providing high quality and safe health services to the residents of the United Kingdom (UK). As an important institution within the UK public sector, the significance of the NHS goes beyond healthcare provision. It is also the largest employer in the UK, with a workforce of more than 1.7 million (www.nhs.uk). The NHS’s vision is to provide affordable and accessible healthcare based on patients’ needs (NHS Plan, 2000). The NHS has deployed various initiatives to move healthcare closer its local population, using innovative services and technologies (Department of Health, 2009a). In the NHS Constitution, innovation is identified as

one of the tools for improving healthcare (NHS, 2010). The National Innovation Centre (NIC) was established to regulate issues of clinical performance and innovation. One of the major achievements of NIC is a tool called scorecard, which helps clinicians and commissioners discover the strength and weakness of their ideas (NHS Institute, 2008). The scorecard also provides improvement suggestions for ideas generated within the NHS. Despite these efforts, the NHS has a lot to do in the area of service innovation to fully achieve its objectives (Wanless, 2004; Sheldon, 2004; Black, 2006; Cooksey, 2006; Liddell *et al.*, 2008; Darzi, 2008). This is not surprising since it is not a new thought in organizational theory and behaviour that large bureaucratic, government controlled, centrally planned organizations are monumentally difficult to change.

Researchers have also shown that organisations initiate and implement new ideas in unplanned manners (Knudsen & Roman, 2004; Hargadon, 2003). This has encouraged studies into the interaction between the innovation process and healthcare outcomes (Den Hertog, Groen & Weehuizen, 2005). According to Shah, Brieger and Peters (2008), the uptake of innovation should be systematically reviewed for successful management. Interestingly, innovation in the health sector has taken a wider approach to embrace not only the work of clinicians but also that of other supporting agencies, patients and regulatory units (Gelijns *et al.*, 2001). It is not surprising that clinical practice innovates since physicians worldwide who practice allopathic medicine have a common culture; however, the organizations within which they operate, not so much. Reports have shown that innovation is being encouraged via different models of health service delivery in the NHS. Based on this background, this study utilised the existing innovation models in the literature to mirror innovative practices in the NHS. The aim is to discover the various factors influencing innovation in the health sector.

Setting the scene

Innovation has been defined from different perspectives. Because “innovation” means different things to different people and organisations, it is challenging to provide a single definition covering all its aspects, concerns and objectives. Innovation has been described as a lengthy, interactive and social concept involving various people from various backgrounds and competencies (Leadbeater, 2003). A more comprehensive definition of innovation is based on the impacts it makes directly on an organisation. According to Mulgan and Albury (2003), this relates to the magnitude of the advance and the dimension of novelty experienced by introducing new products and services. They went further to show the different degrees by which innovation can be distinguished. These include:

- *Incremental innovation*: that expresses minor changes to current services/product: to and processes.
- *Radical innovation*: this is not frequent in organisations but it requires a major breakthrough or discovery.
- *Transformative innovation*: a exceptional type of innovation that makes significant impact on the entire organisational structure

Previous works in the aspect of radical innovation focus mainly on new product development (Williams *et al.*, 2009; Rye & Kimberly, 2007). Likewise, innovation can be defined as newness in product or service delivery. According to Tidd *et al.*, (2005), it is the changes in the products or services being created and delivered to the end users. Johnes and Davies (2000) have underlined the organisational benefit of innovation as a process for improving internal capabilities of

the employees. Other definitions of innovation include the introduction of new forms of organisation, means by which entrepreneurs exploit new business opportunities, the implementation of new ideas (Lundvall, 2007; Schilling, 2006; Tidd et al., 2005) and “a fundamental change in the characteristics of the organisation, its systems of production or market” (Freeman et al., 2006: 2). Innovation is a lengthy and interactive process which combines resources, people’s talent, skills and knowledge (Leadbeater, 2003). Other scholars describe innovation as an assortment of ideas, process, practices and technology that is perceived as new by the adopter (Helfrich *et al.*, 2007). Based on the diverse definitions above, it is clear that innovation is a multi-faceted phenomenon and cannot be explained with a common formula. For the purpose of this paper, innovation is

the conception and implementation of significant new services, products, ideas or ways of doing things in order to improve or reform them, and involves taking risks (Glor, 1997).

True innovations do not come without attendant risks. An innovation-embracing organization must allow the risk takers to take risks and fail without terminating their careers. The adoption of innovation starts with a small number of creative innovators. The diffusion of innovation requires early adopters that take pleasure in being at the frontiers of new discoveries (Rogers, 1995). Friedman opined that,

the acquisition of new technology can be one of the most critical decisions a senior hospital executive makes, and it can have dramatic effects on the organization. (Friedman, 2000:23).

Early adoption is being encouraged amongst NHS staff via the Statement of Clinical Need (SOCN) project. SOCN is instituted to provide an instrument for NHS employees to discover the most important problems and deficiencies in current therapeutic applications, weaknesses in current treatments, difficulties in the use of devices treatments and to guide innovation in health technologies¹. This encourages better communication between NHS employees and other stakeholders of the UK healthcare system. However, there is a view that the health sector still lacks the high-risk characteristics of early adoption. Myers pointed out that:

the healthcare industry lacks a centralized resource that tracks such developments and assesses the impact on hospital service-line demand and capacity requirements (Myers, 2002:231).

Synopsis of change in the NHS environment

The NHS, though a centralised organisation, has witnessed successive changes since its initiation in 1948. From inception, the NHS has been managed and administered in line with government plans and procedures that determine its operating framework. There have been varieties of restructuring and changes in the NHS, most of which have impacted the healthcare landscape with great magnitude. To deal with these inconsistent modifications, innovation will be needed to improve service excellence and reliability (Bessant and Caffyn, 1997). This variety of change must be managed effectively to enhance patient outcomes. In managing change, an organisation can renew its corporate direction, structure, and capabilities to meet the unstable needs of

¹ <http://clinicalneeds.nic.nhs.uk/ClinicalNeedAdd.aspx>

The SOCN project is being established to provide Both Trusts will be ‘early adopter sites’. The project is government funded and aims to encourage better communication between the healthcare industries and staff working in the NHS, in order to design products that have direct applications within this setting.

its external and internal customers (Moran and Brightman, 2001). This could be achieved by introducing new ways of thinking and operation (Hutt, Walker and Frankwick, 1995; Ghoshal and Barlett, 1996). Despite successive reforms, the NHS remains a relatively centralised organisation. Most centralised organisations are slow to adopt innovation (Mintzberg, 1979).

The UK Government has changed its approach to healthcare commissioning in recent years. It started with the internal separation of NHS commissioning function from its providers function. This '*quasi*' market policy has resulted to competition amongst providers of health services. Consequently, there is variety of providers, with more liberty to innovate and improve healthcare services. This change also influenced the dynamic capability of NHS as its staff seek to develop new commissioning competences. According to Peckham (2000), medical and technological innovation cannot be regarded as organisational innovation. This can restrict the scope of innovation regulation in the health sector which consists of both clinical and non-clinical experts. Having realised that both clinical and non-clinical competences are required for enhancing patient outcomes, the NHS World-Class Commissioning (WCC) programme was launched in 2007 (Department of Health, 2008). WCC was initiated to ensure that patients experience is the focal point of healthcare provision. On the contrary, medical professionals within the NHS perceive that they are not given the leadership recognition to make strategic decisions (Iles and Sutherland, 2001; Llewellyn, 2001; West and Anderson, 1996). To this end, the 2010 UK government white paper on the NHS stated the plan to give more powers to the medical professionals. The white paper sets out the Government's long-term vision for putting patients at the heart of everything by empowering and liberates clinicians to innovate, with the freedom to focus on improving healthcare services (Department of Health, 2010).

In the UK, the adoption and diffusion of healthcare innovation is facilitated by the following institutions (Williams *et al*, 2009):

- i. National Institute for Health and Clinical Excellence (NICE)
- ii. Social Care Institute of Excellence (SCIE)
- iii. NHS Technology Adoption Centre
- iv. NHS Institute for Innovation and Improvement, and
- v. Commissioning for Quality and Innovation (CQUIN)

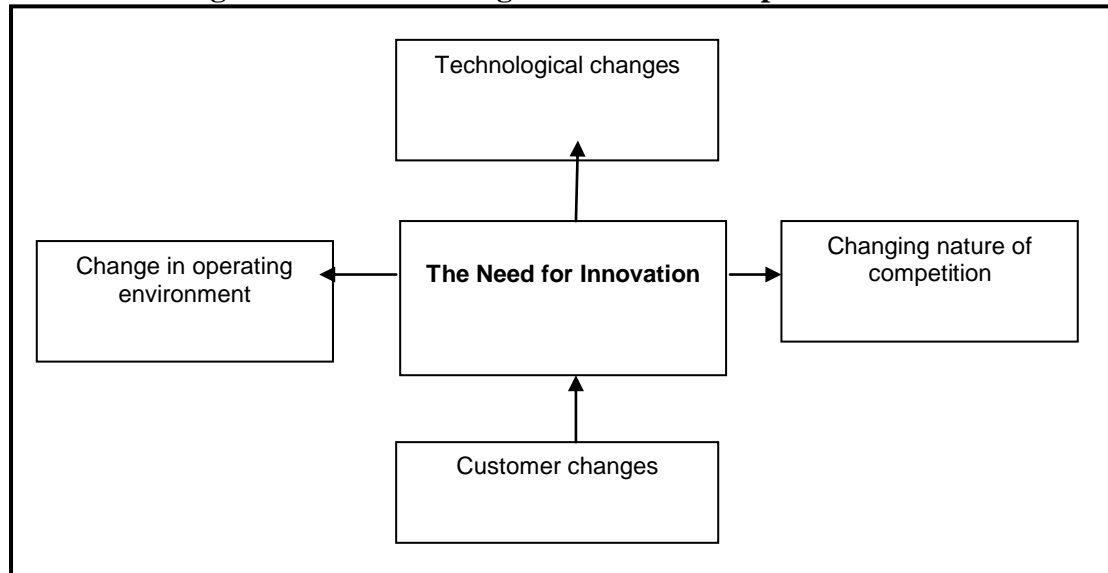
While most studies have acknowledged the contributions of these centres with regards to healthcare innovation, others have challenged their effectiveness (SteelFisher, 2005; Maher *et al.*, 2008, Mugglestone *et al.*, 2008; Department of Health, 2008; Summerhayes & Catchpole, 2006). These institutions are expensive and they contribute to the problems of complexity facing flexible healthcare delivery in the NHS. Besides, there are duplications of responsibilities which have diluted the professional ethics of most clinicians (Christenson *et al*, 2000).

Drivers of innovation in private and public service organisations: a review of conceptual models.

Divergent views exist in the literature on the drivers of innovation. Innovation values will be different among companies as there will be dissimilarities in their business scope and objectives (Berwick, 2003; Varkey, Horne and Bennet, 2006). For example, it is an established fact that forces responsible for innovation and improvement in manufacturing situations are dissimilar to those in service backgrounds (Bloom *et al.*, 2002). This implies that drivers of innovation might be at variance across organisations and sectors. Factors responsible for innovation in the private sector have

been explored in the literature. Most companies innovate in the process of products and services development (Sheth and Ram, 1987). Further studies in this context have identified Changing Customer Needs, Shortening Product Life Cycles, Increasing Global Competition, and Technology as the key innovation drivers in the private sector (Adams, 2003; Goffin and Mitchell, 2005; Cooper, 2001). The drivers of innovation in the private sector are summarised in figure 1.

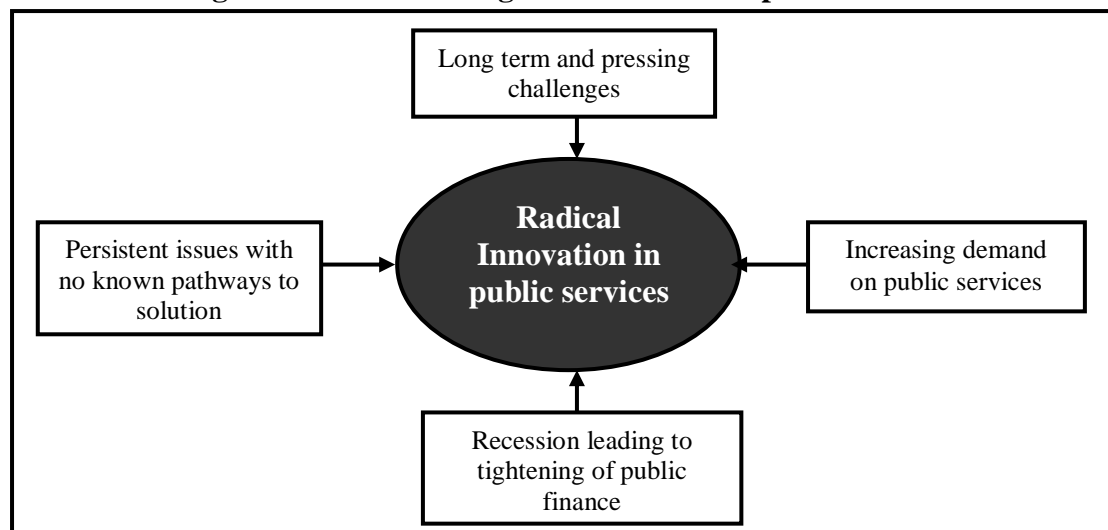
Figure 1: Forces driving innovation in the private sector



Source: Adapted from Cooper, 2001; Adams, 2003; Goffin and Mitchell, 2005.

The drivers of innovation described in figure 1 are very similar to the ones identified in the public sector. For instance, public service firms have witnessed the emergence of new management techniques which enable them to provide customised packages for their citizens (OECD, 2004). This is attributed to the need to satisfy changing citizens' demands and also fulfilling the promises made to their multiple stakeholders (OECD, 2004a). Long-term pressing problems, increasing demand for municipal services, budgetary pressure due to recession and persistent issues with unidentified solutions have been revealed as the key reasons why public sector firms aspire to innovate (NESTA, 2009; Nolan, 2009) (Figure 2).

Figure 2: Forces driving innovation in the public sector



Source: Adapted from Nolan, 2009; NESTA, 2009.

Because similarities exist between forces responsible for spurring innovation in both private and public sectors, researchers have been motivated to use the knowledge of key innovation drivers in the private sector in studying the public sector innovation landscape (Osborne and Plastrik, 2000). Meanwhile, the NHS demonstrates a mixture of private and public service attributes, management structures, stakeholders, ownership, and deliverables (Adams, 2003; Iles and Sutherland, 2001; Department of Health, 2009). In the same way, it innovates by responding to various situations which include changing patients' needs, technologies, nature of competition and operating environment (Adams, 2003). Consequently, the healthcare sector requires a broad framework for considering its drivers of innovation. This can be achieved by building on the understanding of key innovation drivers displayed in figure 1 and figure 2.

Methodology

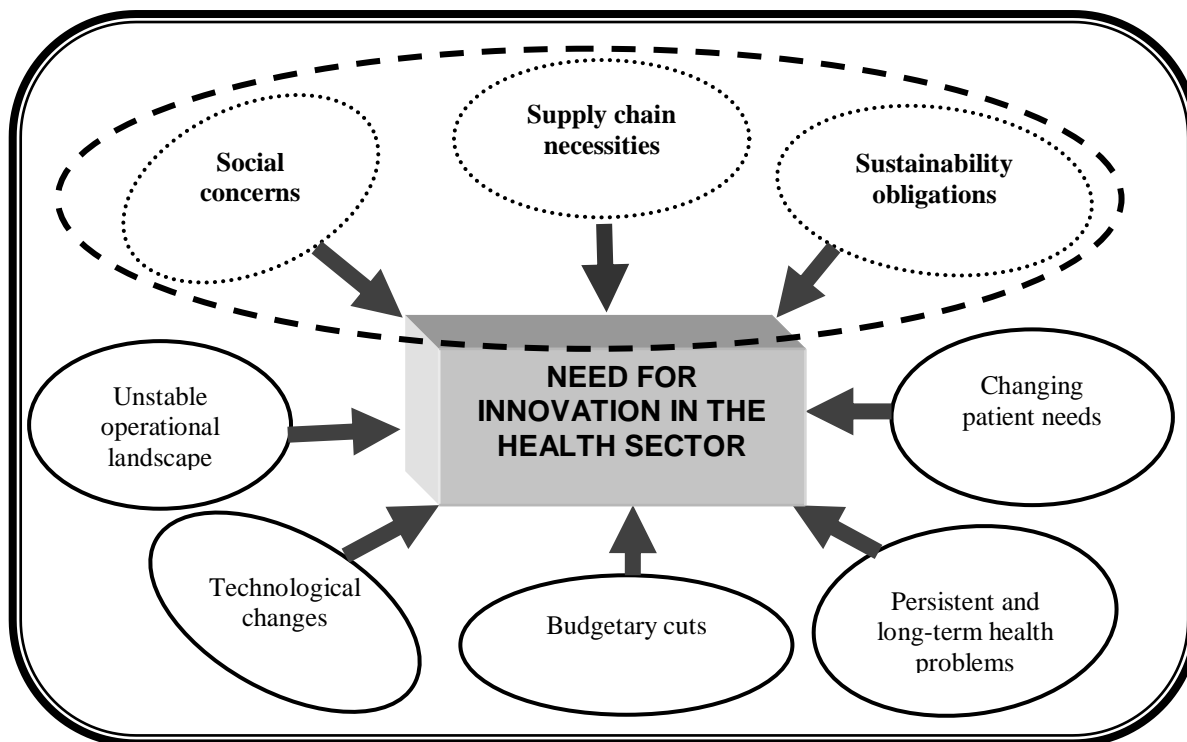
A broad review was conducted of published articles relating to healthcare innovation and drivers of innovation in both the public and private sectors. Articles were sourced by searching databases such as *Interscience*, *NHS Evidence*, *NHS Institute for Innovation and Improvement*, *Science Direct*, *Google Scholar* and *Emerald*. The major words used for the literature search were innovation drivers, healthcare innovation, innovation adoption, innovation management, change and innovative projects. A substantial number of articles relating to innovation drivers and innovation management generally were found in major academic journals. Factors that make important contributions to innovation in the UK health sector were found in NHS-published secondary data. As the largest publicly-funded healthcare system in Europe, the NHS was chosen as a starting point for this research. Secondary data collected from the NHS databases were considered suitable for this study because they enable the identification of specific information relating to innovation in the UK health sector that were not discussed in previous literature.

The use of secondary resources permits the collection of information, which is of proven value and statistically represents the sample population (Cavana *et al*, 2000; Mason, 2002; Easteby-Smith *et al.*, 2004; Jankowicz, 2004). Two different models were then identified, describing the forces driving innovation in the private and public sectors environment. These were displayed in figure 1 and figure 2. The literature also conveys the perceived heterogeneous nature of the NHS in terms of operating both public- and private-oriented schemes. Thus, the models in figure 1 and figure 2 were drawn upon in order to comprehend the forces driving the need for innovation in the NHS. In light of this, a conceptual framework of the forces driving the need for innovation in the health sector was synthesised and discussed in figure 3.

Results

The conceptual framework outlined in figure 3 shows the factors influencing the need for innovation in the health sector. It integrates factors such as social concerns, supply chain necessities and sustainability obligations into the models in figure 1 and figure 2.

Figure 3: A conceptual framework for exploring the forces driving the need for innovation in the health sector



Unstable operating landscape

Having recognised the existing bureaucracy in its management system, the government introduced a market-driven approach to service delivery in the NHS (Rivett, 1998), thus making the NHS more productive and responsive to patients' needs.

In 1990 the NHS and Community Care Act introduced an “internal market” for health care, with the aim of “improving patient services and making the NHS more efficient and responsive to patient needs” Warwick (2007, pp. 194). The internal market health care was introduced to promote competition that would achieve efficiency of health-care provision. This brought about payment by result, choice and plurality of services. As a result, marketing approaches were introduced to ensure that health services are focused on patients needs². NHS employees have to develop customer relationship skills because service users (in this case the patients) are the one making choices about what is suitable for them. This also led to the development of business-related skills and competencies in the employees.

In addition, the NHS recruited new sets of professionals and health service commercial specialists. With this market driven approach, health service providers can categorise their customers into smaller subdivision with more visibly identifiable requirements, in order to assign budget where it is necessary whilst cutting out unnecessary cost (Le Grand, 2003). This approach has been typified inconsistent with the fundamentals of a typical public service authority (Spurgeon, 1998). Other critics have described the changes in the NHS as weak and vulnerable to the political

² The real NHS: the benefits of a marketing approach: The Chartered Institute of Marketing, 2008 <http://www.cim.co.uk/resources/plansandstrategy/nhsmarketing.aspx>

interventions (Iles and Sutherland, 2001). This has caused the government to rethink its methods of service intervention and provision of medical expertise (Rivett, 1998).

Furthermore, clinical services are being redesigned and change is being embraced with the deployment of new management systems (NHS, 2000). Developing WCC competency requirements has enabled Primary Care Trusts (PCT) to embed diverse skills into their workforce. These include proficiencies in the fields of commissioning, procurement, contract management and public engagement (Department of Health, 2009b).

Technological change

Technological innovations influence health care in various ways. The literature suggests that computer automation is has been used to advance healthcare (Dwivedi *et al.*, 2007). New technologies like point of care system and robotics diagnostic systems offer an opportunity to deliver effective and efficient healthcare. Bedside computer technology has enabled hospitals to improve the quality of patient care with a reduction in paper work (Kahl *et al.*, 1991). Similarly, technological innovation has played an important role in improving the healthcare system in the UK by enabling information sharing concerning treatment outcomes in the NHS (Peckham, 1999).

Telemedicine has enabled the synchronisation of patients' interactions with their clinicians. 'Telehealthcare', the system adopted in the UK, is a good example of technological innovation adoption in the NHS (May, Mort, Mair and Williams, 2002). As increases in waiting times affected patients' access to quality healthcare, general practitioners (GPs) devised means to make hospital appointments more easily and faster. This led to the initiation of what is known as 'Choose and Book', an electronic booking service. The 'Choose and Book' has been seen as a facilitator of the appointment planning process (NHS Connecting for Health, 2010). Adams presents a different view that,

The sharply accelerated pace of research discovery and technological progress has outstripped the capacity of the health service to adapt to change, and has resulted in a progressive uncoupling of medical innovation and organisational development" (Adams, 2003: 96).

Changing patient needs

As the UK population increases and develops different healthcare requirements, the demand increases for more patient-focused healthcare plans. Recently, the NHS released its five-year plan for 2010-2014 entitled *from good to great*. The plan is aimed at improving patient safety and healthcare quality (Department of Health, 2010b). Employees' engagement is seen as a critical aspect of this plan. Thus, it provides an opportunity for tapping into the creative ideas of NHS staff (King and Burgess, 2006; Blumentritt and Danis, 2006). According to Fulop *et al.* (2001), patients' knowledge of alternative medical interventions increases with the increasing rate of Internet penetration. This increasing level of awareness motivates them to ask for more personalised healthcare options which cannot be satisfied except through innovative approaches.

In 2005, the department of Health adopted the World Class Commissioning (WCC) framework and launched the "*Commissioning a patient-led NHS' in the United Kingdom*". The purpose of implementing the WCC is to provide high quality health services for the people of England at a strategic level (Department of Health, 2005). Likewise, some clinical services which were previously provided at the hospitals have been replicated in the communities. As a result, patients can access

health services close to their homes. This is innovation because it calls for service redesign and change in the patients' pathways. The NHS recognises the need to align its employees' competence with operational processes to achieve innovative output (Wang & Ahmed, 2007). One of the advantages of this alignment is advancement in the provision of patient centred services (Department of Health, 2009b). This is consistent with the view of Teece *et al* that services reconfiguration is a result of dynamic capabilities.

Today, the patients are better informed through engagement in health service commissioning and procurement. Through patient engagement, clinicians can identify innovative ideas and suggestions for improving the level of services (Teece *et al.*, 1997; Metcalfe, 1995; Aranda & Molina-Fernandez, 2002).

Budgetary cuts

Annually, the NHS spends over £19billion (Department of Health, 2004). Apart from delivering quality service to the larger population of the UK citizens, the NHS has an agenda to maintain financial stability via cost saving strategies. The global financial meltdown has affected the budget for healthcare directly or indirectly. In the beginning of 2006, the UK government conducted a review of public sector spending. The backdrop of this exercise on NHS organisations was budget deficits (Health Committee, 2006; Audit Commission, 2006). Despite the financial challenge in public service arena, the government cannot compromise the quality of healthcare delivery. Hence, the need for novelty in healthcare planning, health service design and delivery. As a result, NHS organisations began to explore new ways of delivering cost savings without reducing the quality of health services.

The introduction of Governments Operational Efficiency Programme's (OEP) shows that operational efficiency not just cost efficiency is vital. The NHS has aligned its activities to this programme through the Operating Framework for England 2010/112 (CISCO, 2010). In addition, the NHS has exploited the opportunities for improving its procedures by adopting smart information technology services. According to Das, Zahra, and Warkentin (1991), the deployment of these Information and Communication Technology (ICT) plays a crucial role in this case by facilitating business processes. Today, most NHS organisations now have flexible systems to manage internal communication and patient confidential information.

Persistent and long-term health problems

The *smoking free scheme* was an innovation contest aimed at discovering new ways of discouraging smoking habits. Smoking and alcoholism are persistent issues that cannot be combated with a single wrap up solution. It is recorded that smoking accounts for more than 60% of gap in life expectance for men in some parts of the United Kingdom (Local Innovation Awards Scheme, 2009). To prevent the incidences of health problems arising from smoking and alcoholism, the NHS applied collaborative strategies. These involve engaging various local small businesses to develop, plan, implement and disseminate promotional packs for stop smoking campaign. Awards are consequently given to enterprises that independently develop their own smoking free schemes (LIAS, 2009).

The health sector faces another critical challenge with the provision of high quality and cost effective healthcare for people living with long-term health conditions. Long-term care is a critical part of the NHS healthcare agenda because it is about providing care for the ageing population. To reduce the number of old people in institutional care homes, *Telecare* delivery system was introduced. This innovative

solution aids the provision of health and social care to individuals in their homes via ICT (Department of Health, 2001). Concomitant with the problems of long-term care is the provision of services for people living with rare but significant diseases. The problem with rare diseases is the low number of patients who need high cost interventions. According to The East Midlands Specialised Commissioning Group (EMSCG), treatments for rare diseases are provided by relatively few specialist centres or hospitals based in towns and cities (EMSCG, 2010). In response to this challenge, the treatments for rare diseases are given special attention. These are categorised as NHS specialised services. According to the UK legislation:

specialised services are defined as those services that needs planning population catchment area of more than a million people and services for patients who have these diseases are commissioned nationally for the whole of England (NHS Specialised Services 2007:14).

Specialised services need a critical mass of patients to make treatment centres cost effective. therefore, they are commissioned both on a regional and national basis.

Supply chain necessities

Early confirmation of how firms realise innovation while responding to supply chain management challenge exists in literature (Porter, 1979). While most of the evidences on supply chain innovations are linked to the manufacturing setting, its applicability in the service sector have been acknowledged (Murphy & Smith, 2009). Forward Commitment Procurement (FCP) is an example of innovation from managing the supply chain of the NHS. FCP was used to enhance efficiency of hospital wards lighting through sourcing ultra-efficient lighting technology (Andrew, 2010). Similarly, Request for information (RFI) is used as a tool to identify and procure potential innovative products and services form the health supply market. In 2009, NHS supply chain initiated the “Innovation Scorecard” which allows suppliers to register innovative clinical products. Consequently, the list of Top 10 innovations was compiled and distributed to procurement officers in various NHS hospitals (Brentnall and Morrison, 2009). In the literature, the development of new products and services has been influenced by supplier (Petersen, Handfield & Ragatz, 2005; McGinnis and Vallopra, 1999). Presently, the evidence concerning innovations by supplier engagement in the NHS is limited, but procurement has helped in securing modern medical products.

Social concerns

The UK government has recognised the implications for innovation in engaging small and medium-sized enterprises (SMEs) (Office of Government Commerce, 2005). SMEs have the potential to introduce novel products and service to the marketplace using their dynamic capabilities (Easterby-Smith et al, 2009). These capabilities enable them to trigger new ideas and usher in innovative solutions to organisational problems (Makadok, 2001). The NHS has a social responsibility to provide quality healthcare for UK population. In addition to this, NHS has identified the need to address the impacts of its activities on the society.

One of the social policies of the NHS is to increase SMEs access to procurement and contract opportunities. By developing social criteria into tenders and contract, the NHS has been able to integrate SMEs into its supply chain (Department of Health, 2008). As part of the core competence for WCC, the PCTs are expected to stimulate local markets and set up small providers for sustaining future supply. Commissioners are now required to identify where contract could be split into lots for

attracting SMEs. Also, special training was conducted to identify and reduce the barriers faced by SMEs during procurement in the NHS. The government provided to the commissioners to aid their engagements with local suppliers and social enterprise (NHS Northwest, 2010).

Sustainability endeavours

In the literature, organisations have developed new products and services while acting in response to sustainable development objectives (Dobers, 1993). These involve the introduction of green products (Szolnai, 2006), the adoption of sustainable operational processes (Venselaar, 2003), and the implementation of environmental regulations (Wubben, 2000). Lately, the term “sustainable innovation” becomes well known in both research and practice. Rennings defined sustainable innovation as:

An activity that leads to the introduction of new ideas, products, and services and process that alleviate sustainability challenges (Rennings 2000:21).

Likewise, the NHS has made some groundbreaking improvements in pursuit of global sustainability agenda. For instance, a collaborative project involving the Local Improvement Finance Trust companies (LIFT) and NHS- Sustainable Healthcare Network (SHINE) has assisted some UK hospitals to understand how sustainable facilities can help in achieving operational efficiency. A lot of benefits are derived from this project by exchanging of information on sustainable alternatives and lessons learned from case study (SHINE, 2010).

According to the NHS Sustainable Development Unit (SDU), the combined heat and power (CHP) scheme at Birmingham Heartlands & Solihull NHS Trust has helped the hospital to generate its own electricity from a gas-powered engine with improved cost and environmental performance (SDU, 2009). It is important to note that most of these innovations were not anticipated, but they appear as the NHS respond to sustainability concerns.

Conclusion

The common problems facing the health sector today are unstable patient needs, variations in treatment options, cost and quality (Varkey, Horne and Bennet, 2006; Omachonu and Einspruch, 2010). In view of the rapidly changing environment, healthcare organisations require innovative capabilities to cope with unexpected events. Greater efforts are required to provide reliable health services in times of financial crisis.

Previous research on healthcare innovation has focused on clinical and medical technologies. With an aging population and declining health budgets, service innovation is needed in responding to the diverse nature of patients’ needs (Peckham, 2000; Adams, 2003). This study has shown the multidimensional outlook of forces driving the need for innovation in the health sector. The findings uphold the assertion that innovation has been the NHS response mechanism to turbulent environment (Adams, 2003; Fulop *et al.*, 2001). In addition to the well-known drivers of healthcare innovation, other factors have also been discovered. For example, innovation could be realised by responding to the supply chain issues, social concerns and through sustainability endeavours.

The major problem with the health sector is not the scarcity of innovation but dissemination of innovative concepts (Berwick, 2003). Healthcare organisations should develop competences and practices for promoting ideas generation and investment in early adopters (Varkey, *et al.*, 2008). The problems facing the health sector are numerous and cannot be addressed with a particular solution. Attention

must be paid to the various forces within and outside the organisation because these might create opportunities for innovation.

Overall, this paper provides data demonstrating that several factors are responsible for innovation in the health sector. Even though previous studies expressed uncertainty over the affordability of managing new inventions in the health sector (Lehoux et al., 2008; Williams *et al.*, 2008), the paper finally presents a conceptual framework by which policy makers and researchers can analyse the factors influencing innovation in the health sector.

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Temidayo O. Akenroye is currently working as a healthcare procurement consultant with the National Institute for Health and Clinical Excellence (NICE), UK. He is also a Visiting Lecturer in Supply Chain Management, Procurement and Logistics at the University of Salford, United Kingdom. He holds a Master (MSc) in Supply Chain Management and a Post-Graduate Diploma (PGDip) in Shipping (Logistics) Technology. Temidayo is a PhD candidate at the Centre for Leading Innovation and Cooperation, Leipzig Graduate School of Management-HHL, Germany. He is an alumnus of the Cambridge Programme for Sustainability Leadership (CPSL), University of Cambridge, and a full-member (MCIPS) of the Chartered Institute of Purchasing and Supply, UK. His area of teaching and research includes supply chain management, innovation management and sustainable procurement. He may be contacted at dayoaken@yahoo.com

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