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Frugal innovation in healthcare and its applicability to developed markets

Abstract

Frugal innovation, a relatively new concept in social scientific research, has a long cultural history in low-income developing markets. Finding its origin in the Hindi word "*Jugaad*", it is a synonym for efficient, low cost solutions to everyday problems. Frugal innovation in healthcare is exemplified by cases such as Aravind Eye Care, which uses creative means to expand access. This study progresses the concept of frugal innovation in healthcare, and considers its prospect as a solution for those developed nations struggling with growing budgetary constraints and increasing customer demands. The empirical element stems from 17 global or regional healthcare organizations. Findings contribute to extant literature by focusing on the dynamic capabilities that have made frugal innovation in healthcare successful in developing markets and consider how easily acquirable or configurable these may be in mature economies. The evidence suggest that similarly to challenges with lean healthcare, current organizational structures may be incapable of absorbing more radical innovative transitions. The paper concludes with a framework for implementing successful frugal innovation in developed counties.

Keywords: Frugal innovation, healthcare, management, case study

1. Introduction

The Global Financial Crisis (GFC) has adversely affected healthcare systems in most developed nations (Kaplan, 2012). Whilst available healthcare budgets have been challenged by significant declines in real annual GDP and extensive unemployment, many believe that the crisis has a more direct negative impact on population health, through psychological distress, increased risky behaviors, and deteriorating neighborhood conditions (Curtis & Leonardi, 2012; Kaplan, 2012; Stuckler, Basu, Suhrcke, Coutts, & McKee, 2009). Health inequalities may also be exasperated by prolonged economic downturns in “welfare states” (Mackenbach, 2012), a combination of effects likely to place further demand on the healthcare systems at the very time when economic resources are most stretched.

Political discourse on reforming public services in the post-GFC world has been criticized as being largely ideological, advancing market-focused reforms, and the “evangelical promotion of *lean* [management] into public services” (McCann, 2013, p. 13) . As noted by several authors (e.g. Burgess & Radnor, 2013; Joosten, Bongers, & Janssen, 2009; Waring & Bishop, 2010; Young, 2008), healthcare in OECD countries has been particularly targeted for the application of lean tools. The recent WHO (2013) report is perhaps representative of this focus, and suggests that of the \$6.5 trillion global expenditure on healthcare, as much as 6% of the annual expenditure on healthcare, maybe wasted due to inefficiency. Inefficiency is seen as fundamentally contributing to rising costs and the need for more economically efficient solutions (Christensen, Bohmer, & Kenagy, 2000; KPMG, 2012). Advocated solutions, such as *Lean Healthcare*, are tasked with “contain[ing] or reduc[ing] public healthcare spending, while simultaneously assuring levels of service and, in some cases, extending provision to marginalized groups” (Waring & Bishop, 2010, p. 1332). However, this current framing of *lean* initiatives have been said, to offer limited potential for success (Radnor, Holweg, & Waring, 2012), face considerable resistance from health professionals (Joosten et al., 2009), and incapable of delivering the effective and efficient improvements claimed (Waring & Bishop, 2010). While efficiency demands for public sector services are steadily increasing, prior studies offer very limited evidence of successful lean initiatives in healthcare. Given the need for significant change in the sector, where might alternative inspiration be found?

In the developing markets, such complex challenges are common and local healthcare organizations are developing innovative business models to deliver services to meet growing health demands, to an increasing population at a very low cost (Anderson & Markides, 2007; Kanter, 1999; Prahalad & Mashelkar, 2010; Svensson, 2001). These organizations may offer useful examples of innovative practice that could be adopted elsewhere. Rather than mere efficiency improvements, such models represent radical reconceptualization of the provision of services that is informed by principles of: affordability to even the poorest consumer, adaptability to local cultural conditions, availability through easily accessible channels, and promotion by educational awareness building (Anderson & Markides, 2007 See also: ; Hart & Christensen, 2002; Kanter, 1999; Prahalad & Mashelkar, 2010).

A widely cited example of what has been labeled frugal innovation in healthcare is Aravind Eye Care. Aravind conducted approximately 280,000 eye surgeries in 2011 as compared to the UK National Health Service (NHS) that conducted around 450,000 surgeries. However, Aravind's costs of delivering these services accounted for only £13.8 million (£50 per operation) whilst NHS costs were £1.6 billion (£ 3,555 per operation) (Vickers & Rosen, 2011). Similarly, Narayana Hrudalaya performed twice as many cardiac surgeries relative to the leader in this field in USA with the cost for a surgery of \$2,000 as compared to \$20,000-\$100,000 in the USA (M. G. Singh, Gambhir, & Dasgupta, 2011).

Though frugality may be considered an ancient concept, the term *frugal innovation* was coined only recently in management literature (Bound & Thornton, 2012; Hart & Christensen, 2002; Kanter, 1999; Petrick & Juntiwassarakij, 2011; C.K. Prahalad & Mashelkar, 2010). Frugal innovation challenges organizations to think beyond minor cost-base improvements to existing in products or services, and demands redesign and reconfiguration of capabilities, resources, and competencies. Nesta, a UK charity, which promotes application of frugal innovation models, suggests by "minimizing the use of resources in development, production

and delivery, or by leveraging them in new ways, frugal innovation results in dramatically lower-cost products and services¹.

This study sets out to investigate the following overarching research question: *What capabilities might enable healthcare organizations in developed economies to adopt frugal innovation?* The paper elaborates and refines theory through an in-depth empirical investigation. In doing so, the study bridges literatures on healthcare management and dynamic capabilities in changing developed healthcare markets with those of frugal innovation that are largely restricted to application in emerging markets. The paper builds on existing work by directly addressing the extent to which these business models and organizational practices may be transferable to other operating contexts. The empirical background is derived from rich primary and secondary datasets from in-depth interviews with senior decision makers, case studies, and advisory reports. The research makes two distinct, but cumulative contributions. First, it provides one of the first in-depth empirical investigations of frugal innovations in healthcare, and the potential for adoption in developed economies. Second, it situates our understanding of healthcare services within a conceptual framework that emphasizes the organizational capabilities needed to successfully survive and nurture change. Together, this establishes a framework to better understand the capabilities needed for innovation in healthcare organizations and drives further fruitful research in this context.

This remainder of the paper proceeds to consider the conceptual framing for frugal innovation and dynamic capabilities in healthcare management before introducing the methodological approach adopted. Then, the paper presents in-depth findings from samples in developed and developing contexts before discussing the finding in light of extant literature. The paper concludes by positioning a revised conceptual framework and drawing out practical and theoretical contributions.

¹ <http://www.nesta.org.uk/news/frugal-innovations> [Accessed 2014-01-31]

2. Conceptual background

2.1. Frugal innovation

A new perspective on innovation in the developing world is emerging in academic literature that identifies the potential for resource constraint as a catalyst for radical process, product and business model innovation (Hart & Christensen, 2002; Kanter, 1999; C.K. Prahalad & Mashelkar, 2010). Largely, frugal innovation has been poorly defined in academic literature and several terms have been used interchangeably for the phenomenon. For example, 'Gandhian' innovation (C.K. Prahalad and Mashelkar (2010), 'jugaad' innovation (Radjou, Prabhu, and Ahuja (2012), and 'frugal' innovation (Bound & Thornton, 2012; S. K. Singh, Gambhir, Sotiropoulos, & Duckworth, 2012; WHO, 2012; Zeschky, Widenmayer, & Gassmann, 2011). Frugal Innovation has been associated with "*responding to severe resource constraints with products having extreme cost advantages compared to existing solutions*" (Zeschky et al., 2011, p. 39). A significant driver for these innovations are the considerations of un-met customer needs faced in developing markets with large populations, pertinent health issues, and low income per capita (Lim, Han, & Ito, 2013).

The framing of frugal innovation in healthcare used in this paper is derived from resource-based theories of organizations (following Barney, 1991; Barney, 2001; Dosi, Nelson, & Winter, 2000; Nelson & Winter, 2002). Frugal innovation is taken to be fundamentally business model innovation, that requires new *resource* structures i.e. "organizational configuration of resources, capabilities, and activities", *transactive* structures "the interactions between the firm and its key stakeholders", and *value* structures "system that defines, supports, and controls the processes of value creation and capture" (George & Bock, 2011, pp. 100-101). Such innovation has been demonstrated to "differ fundamentally from product and process innovation" and require more systematic reconfiguration of capabilities (Bock, Opsahl, George, & Gann, 2012). Such significant organizational changes may be associated with disruptive or radical innovation (C.M. Christensen & Overdorf, 2000; Ettlie, Bridges, & O'keefe, 1984; Veryzer Jr, 1998), where creation of new organizational capabilities is required, and dramatic improvements in relative performance is typically enabled. The definition positioned

above reflects the characteristics identified with frugal (Gandhian) innovation suggested by Prahalad and Mashelkar (2010), which include radical changes to the business dynamics (e.g. new pricing or distribution models), modification of existing organizational capabilities, and the acquisition or creation of new capabilities. Thus, *frugal innovation* might be distinguished as a disruptive business model innovation, whereas, *lean healthcare* might be considered an incremental process innovation (Abernathy & Utterback, 1978; Ettlie et al., 1984).

The market context for frugal innovation model has been referred to as Base of Pyramid (BoP), a market that consist of over 4 billion of the world's population living on less than \$2 a day (Hammond, Kramer, Katz, Tran, & Walker, 2007; C.K. Prahalad & Hart, 1999). BoP markets have consumer characteristics of significant unmet needs, unreliable, informal or subsistence incomes, and demand for small affordable quantities of goods/services (Anderson & Markides, 2007; Petrick & Juntiwarakij, 2011; C.K. Prahalad, 2012). Operating in markets with such severe constraints has been seen as offering stimulus for incubating ideas like frugal innovation that evolves to meet those unmet consumer's needs (C.K. Prahalad, 2006). Prior studies have provided examples of frugal innovation that are deeply rooted in developing markets, where creative and efficient use of scarce resource is common (Bound & Thornton, 2012; Radjou et al., 2012; M. G. Singh, Gambhir, & Dasgupta, 2011).

Examples of the concept from other sectors include M-Pesa, a virtual mobile money that delivers "un-met" financial services i.e. those who do not have access to banks and ATM facilities (Aker & Mbiti, 2010; Safaricom, 2012). Users can pay for goods and services with their mobile phones reducing the need and safety hazards of carrying cash in those areas. M-Pesa had over 14 million registered users and close to 28,000 agents within 3 years of its launch (Safaricom, 2012). Innovations like M-Pesa have changed the financial system in countries like Kenya by reaching out to those who do not have access to resources. Other examples of such innovations in other areas include: Mini Magical Child washing machine in China with the capacity of washing only daily loads; Tata Nano car in India with no extra features like power steering and air conditioning selling at \$2,200. Similar examples in healthcare include Jaipur Foot, who provide low cost prosthetics, and LifeSpring Hospitals providing maternity care (Arya & Klenerman, 2008; D'Souza, 2012).

Whilst prior literature provides evidence on why frugal innovation has been successful in developing markets, there is limited empirical research on the capabilities needed to transfer and implement such practice to other contexts. Immelt, Govindarajan, and Trimble (2009), illustrated how General Electrics (GE) used a 'reverse innovation' approach by applying frugal innovation strategies to its mature markets. The company balanced its two opposing strategies of 'globalization' and 'reverse innovation' to establish frugal innovation in rural India and China, then apply this learning successfully in the USA and Europe (Immelt et al., 2009; Svensson, 2001). Immelt et al. (2009) explain how such models cannot simply modify existing offers, but have to address a niche by creating a new market of their own (Kim & Mauborgne, 2005). Zeschky, Widenmayer, and Gassmann (2011) argue that frugal innovations are not temporary solutions solely for low-income consumers, but have potential with cost-conscious middle class population in developed economies. Essential to the concept of frugal innovations is that these do not represent sub-standard quality offerings; they are simply 'no-frills' innovations performing the same functions as existing goods (Radjou et al., 2012).

Prior studies suggest that frugal innovation is not just about the design of final goods/services, but requires development of both organizational capabilities and active boundary-spanning interaction with external stakeholders to discover potential for growth, and overcome barriers, allowing those innovations to prosper (Stadler, Helfat, & Verona, 2013). In many cases, regulatory and operating environments pose serious challenges to innovation. In their work, Singh et al. (2011) describe how the operating environment in India has changed towards supporting frugal innovation through collaboration with Government, development of practice clusters and increased investments in research and patents. Active collaboration, investment in capabilities, and identification of new opportunities, have enabled many business models catering to BoP markets – from Mobile Money in Africa, Aravind Eye Care in India to Grameen Bank in Bangladesh (Hammond et al., 2007).

2.2. Frugal innovation and capabilities in healthcare

Considering the organizational capabilities associated with innovation in emerging markets, a number of meta-capabilities can be identified (Table 1) (Anderson & Markides,

2007; Kanter, 1999; Lim et al., 2013; C.K. Prahalad & Mashelkar, 2010; Zeschky et al., 2011). Fundamental to the success of frugal innovation is the boundary spanning acquisition of detailed market specific knowledge (See: *acquire, monitor, and integrate market knowledge*). The integration of such knowledge is utilized by organizations to *design cost-sensitive solutions* that are able to take account of local or group customer needs such as poor infrastructure or lack of transport (See: *accommodate variations for specific customer groups*). The capability to *secure and improve access to resources* is common to findings across many management contexts; the distinction for frugal innovation is the specific reference to collaboration and complementary activities that emphasize the boundary-spanning nature of these successful frugal innovation organizations.

<INSERT TABLE 1 ABOUT HERE>

Table 1 Meta-analysis of organizational capabilities for frugal innovation

Meta-capability	Critical organizational capabilities for frugal innovation
Acquire, monitor, and integrate market knowledge	Acquisition of detailed knowledge of social issues, conditions, and preferences faced by customers (Kanter, 1999).
	Establishment of strong committed partnerships with multiple stakeholders such as governments, regulators, and community sector organizations (Kanter, 1999).
	Mechanisms to observe and mimic successful practices of other market entrants competitors, peers, and comparable organizations (Levesque & Shepherd, 2004).
	Acquire local talent in local markets in situ to build knowledge of local needs and practices (Petrick & Juntiwasarakij, 2011).
	Facilities for creating, acquiring, managing, and exchanging information both internally and externally that facilitate knowledge building. Knowledge networks might include partners, employees, managers, and stakeholders at both formal and informal levels (Thakur & Hale, 2013) (Yu, Dong, Shen, Khalifa, & Hao, 2013).
Accommodate variations for specific customer groups	Delivery of services, which are acceptable to the unique needs of customers, embracing specific national or regional cultural or local socioeconomic requirements (Anderson & Markides, 2007).
	Availability to service isolated communities where infrastructure might be fragmented or nonexistent (Anderson & Markides, 2007).
	Development of awareness of service offerings via suitable communication modes and methods for those who may not have access to typical channels (Anderson & Markides, 2007).
	Integrate practices for communication and distribution that build on personal relationships, leverage rapidly reconfigurable supply networks, and allow for unorthodox delivery methods (Petrick & Juntiwasarakij, 2011; Zeschky et al., 2011).
Design cost-sensitive services	Provision of services that are affordable to those on low-incomes with unpredictable incomes (Anderson & Markides, 2007).
	Processes for "design to cost" services to meet low-income customer limitations, frequently without benchmarks of comparable offerings (Lim et al., 2013).
Secure and improve access to resources	Collaborations with suppliers to develop new components, technologies, or raw materials (Lim et al., 2013).
	Creation or integration of complementary resources and knowledge for research, development or continuous improvement (Lim et al., 2013).

Indian, China, and Thailand have been particular identified as hotbeds of healthcare innovation in emerging markets (Petrick & Juntiwassarakij, 2011). Frugal innovation, especially in India, has been a major contributor for addressing health issues and large un-served needs in the lower end of these growing populations (Lim et al., 2013; C.K. Prahalad & Mashelkar, 2010). In India, the home of many frugal innovations, The Government is actively supporting a 'Decade of Innovation' with increases in science budgets and allocation of funds towards research (Bound & Thornton, 2012). In 2012, World Health Organization (WHO) highlighted the development of innovations in BoP markets (WHO, 2012). Early innovations attempted to simply strip medical products and services of peripheral features to reduce costs in developing markets (ibid.). Today, innovation entails entirely new business models, designed as simple but effective products and services specifically for developing markets. Whilst these same commercial offerings might be suitable more mature developed markets, the extent of their success in developed markets and challenges faced by organizations implementing these innovations has been poorly documented (WHO, 2012).

Prior literature offers only sparse empirical evidence of frugal innovation (e.g. Anderson & Markides, 2007; Yu et al., 2013). Moreover, the majority of studies consider only examples within developing world contexts, with very little coverage of healthcare related innovation. A further limitation of existing literature is the very limited empirical treatment of the processes of diffusion in healthcare innovation, or the mechanisms and capabilities needed to successfully learn from alternative contexts. As discussed earlier, the case study of GE Healthcare is the only analysis of Multinational Corporation (MNC) adapting healthcare innovations from developing markets to developed markets (Immelt et al., 2009; Lee & McNamee, 2013; Zeschky et al., 2011). The objectiveness of this analysis might however be compromised as it is written the CEO of the company itself, and provides limited conceptualization of the organizational capabilities needed to address these challenges.

Literature on frugal innovation in healthcare is restricted to largely anecdotal analyses of why and how these innovations succeed in developing markets. As with *Lean Management*, much of this attention is limited to incrementally increasing process efficiency, with little analysis of the capabilities that must be acquired for radical change (KPMG, 2012; Macdonnell

& Darzi, 2013; Singh et al., 2012; WHO, 2012a). Current literature concentrates on promoting “good cases” for development contexts and does not cover applicability or transferability of such business models to more developed markets. Whilst considerable academic attention has been directed at the limitations of incremental process innovation in lean healthcare, little exploration of the potential for more radical frugal innovations to be adopted by healthcare organizations in developed contexts. In academic literature, only GE’s efforts in this field have been documented (Immelt et al., 2009), with global crisis looming in the cost of healthcare urgent attention is needed to learn lessons from contexts which have developed a resource constrained approach to healthcare provision. *“The current model is no longer sustainable...We are living longer and that means our bodies become harder to maintain...the State simply does not have the money to cope” (Sir Thomas Hughes Hallett of Marie Curie²).*

This research, aims to address this considerable issue by identifying to what extent healthcare organizations in developed markets might be able to develop capabilities identified with frugal innovation.

<INSERT TABLE 2 AROUND HERE>

²<http://www.dailymail.co.uk/news/article-2420902/NHS-afford-treat-free-says-UKs-health-experts-Sir-Thomas-Hughes-Hallett.html> [Accessed 16-09-2013]

Table 2 – Extant empirical studies of emerging market innovation

Article	Journal	Objective of research	Sample and Method
(Anderson & Markides, 2007)	MIT Sloan Management Review	Multiple case-studies to develop conceptual framework for strategic innovation in emerging markets	Multiple companies, countries, and Industries (No healthcare, exact sample undisclosed)
(Arya & Klenerman, 2008)	The Journal of Bone and Joint Surgery	Case study to understand of design and market implications for prosthetics in emerging markets	Single company case study on Jaipur Foot. (Healthcare)
(Immelt et al., 2009)	Harvard Business Review	Single case focusing on strategies for entering emerging markets.	Single company case GE (Healthcare)
(Lim et al., 2013)	Technovation	Single case focusing on the detailed product development processes	Single company case study on Tata (Automobile)
(Thakur & Hale, 2013)	Journal of Business Research	Successful factors in service innovation and variations between country contexts.	Comparative India vs. USA service firms (Inc. medical). Total of 440 surveys of firms.
(Yu et al., 2013)	Journal of Business Research	Role of organizational learning in emerging market innovation	Survey of 114 firms operating in China (mixed Industry)
(Zeschky et al., 2011)	Research-Technology Management	Role of local knowledge and subsidiaries in frugal innovation	Multiple companies case studies including three healthcare providers in China.

2.3. Regulation of innovations in healthcare

Even if an organization has the necessary capabilities, active boundary-spanning routines are needed to allow innovations to overcome any regulatory challenges to implementation. Surprisingly, extant studies pay scant attention to engagement with regulation, and its enabling or debilitating impact on healthcare innovation (Singh et al., 2011). Critical to the potential transference of frugal innovation between markets is the acceptance or legitimacy of new innovations in a market, and the regulations and norms that govern local operations (Akhtar, 2011; Ferlie & Shortell, 2001; Hafez, 1997). Regulations in the context maybe considered as “any social action exerting an influence, directly or indirectly on the behavior and functioning of healthcare personnel and/or organizations” (Hafez, 1997, p. 13). Regulation in the form of licensing, accreditation and certification govern healthcare organizations, personnel, equipment, services and drugs across developed economies. However, the regulatory environment and systems for healthcare vary considerably between countries, making diffusion between market contexts challenging (Akhtar, 2011; Ferlie & Shortell, 2001; Hafez, 1997; WHO, 2010).

The US healthcare industry faces high regulations at a state, regional, and non-governmental level (Hafez, 1997). Commercial insurance companies and the federal Medicare and Medicaid insurance programs are the key players in the healthcare system and the pharmaceutical and medical technology industry is heavily regulated by the federal Food and Drug Administration (FDA) (ibid.). Whilst there is a high level of privatization, there is a low level of regulatory freedom. Similarly, in the United Kingdom, the centralized system of the National Health Service (NHS) instills a rigid, top-down approach to regulations in healthcare financing, delivery and quality (Ferlie & Shortell, 2001). Centralized welfare state models are the dominant influencing factor for most developed countries including Germany, Canada and Australia. Ferlie and Shortell (2001) assert that pre-existing healthcare systems in economies like the UK must evolve to make way for more entrepreneurial, accessible, and local focused initiatives. It was also recommend that countries such as the US need greater balance between decentralized dependence on privatization and insurance, and limited state provisions for those on subsistence incomes (Ferlie & Shortell, 2001). The area of regulations in healthcare in

developing markets has not been explored in as much depth as developed markets and the literature is limited in comparison (Faulkner & Kent, 2001; Akhtar, 2011). Regulations in low-income countries are primarily controlled by the state but often lack proper enforcement properly due to resources and capabilities limitations, in these contexts non-government and international development agencies frequently fill voids (ibid.) This may result in poor quality control, information asymmetry, inequity of access and limited consumer protection (ibid.).

2.4. Frugal innovation: The need for dynamic capabilities

The phenomena under investigation, frugal innovations, represent a business model innovation that requires new capabilities, for resource efficient, low cost products and services that maintain a level of quality. As identified in Table 1, organizations that practice frugal innovation require a certain set of capabilities enabling them to deliver services at scale, and cater to a cost-sensitive audience by creative bundling of their competencies, resources and knowledge (Bound & Thornton, 2012; Radjou & Prabhu, 2012). This configuration of resources, competencies, skills and routines gives rise to competitive advantage through high efficiency and low wastages resulting in lower costs for both the organizations and its consumers (After, Barney, 1991). For this paper, frugal innovation is examined under a dynamic capabilities framework (Teece et al, 1997). Dynamic capabilities are defined as “organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die” (Eisenhardt & Martin, 2000; p.1107). Dynamic capabilities are those resource focused processes that “integrate, reconfigure, gain and release resources” and “the organizational and strategic routines by which firms achieve new resource configurations” (ibid.; p. 1100). Here, ordinary or static capabilities are associated with normal day-to-day operations, whereas dynamic capabilities are those that enable the organization to deliver new goods or services, or access new markets (Stadler et al., 2013). Thus it might be considered that a concentration on dynamic capabilities might enable frugal healthcare innovation, whereas rationalization of static capabilities might facilitate lean healthcare (Burgess & Radnor, 2013; J. Waring & Bishop, 2010).

Dynamic capabilities refer to the capacity of organizations to build on being more than a bundle of resources with the aim of sustained competitive advantage (K. M. Eisenhardt & Martin, 2000; D. J. Teece, 2007; David J Teece, Pisano, & Shuen, 1997). Organizations can achieve sustainable competitive advantage by: integrating resources, alliances and partnerships, strategic decision making and reconfiguring internal resources (Eisenhardt & Martin, 2000). For frugal innovation established in developing world contexts, this implies organizations must navigate a constantly changing business environment by deploying creative responses (Teece et al, 1997). For organizations acting within legal constraints,

dynamic capabilities comprise identifying market opportunities and threats, acting on these opportunities, and configuring resources to deliver sustained competitive advantage in the context of those regulated business practices (After Teece, 2007). This paper shall utilize dynamic capabilities as a central organizing concept whilst establishing a number of research questions for investigation. These value-creating strategies are taken to depend on the external market conditions, ability of the organization to adapt, and the regulatory environment of operation. Several different conditions are pertinent to developing markets that may or may not be adaptable for more mature markets. These will represent routines and structures that healthcare organizations must dynamically navigate. These can be summarized under three themes that exemplify configurable aspects of dynamic capabilities for frugal innovation relating to the acquisition of market knowledge, the configuration of organizational capabilities, and the navigation of applicable regulatory environments.

2.4.1. Acquire, monitor, and integrate market knowledge

Emerging economies are high growth markets with increasing needs for goods and services, growing middle class population with higher disposable income and weak institutional and infrastructural systems (Hart & Christensen, 2002; Malik & Aggarwal, 2012). Dynamic capabilities involve sensing and shaping markets opportunities and adapting to the new needs by enhancing resources (Luo, 2001; Teece, 2007). Organizations in developed markets have adapted to the existing market and consumer needs. However, healthcare organizations in developed markets are changing rapidly with a shift to low cost and higher efficiency (Bound & Thornton, 2012). According to Lee and McNamee (2013), for reverse innovation in healthcare to succeed it is important that healthcare service providers understand frugal innovation and its potential. Sensing market opportunities drives practices in organizations to deliver products and services that are acceptable to the market (Shane, 1993). In healthcare, where quality and standards are of utmost importance, level of acceptance in developed markets is an area that needs to be tested for frugal innovations (Christensen et al., 2000; Hafez, 1997). Customers in developed markets are conditioned to healthcare products and services of a certain type, which are not based on a concept like frugal innovation, thus customer acceptance of frugal innovation remains to be tested.

Research sub-question 1: To what extent do healthcare organizations in developed markets have capabilities to monitor and acquire knowledge about potential frugal innovations?

2.4.2. Configure organizational capabilities for frugal innovation

Frugal innovation is not simply about changing the product or service to being low-cost; it involves changing or acquiring entire organizational processes towards frugality. As seen in the early literature review these may be summarized as: enabling cost-sensitive services, accommodating variations for specific customer groups, acting to secure and improve access to resources (See Table 1). According to Teece et al. (1997), managerial processes are routines, patterns and practices. These processes require continuous change and upgrading. This also includes organizational and managerial learning to sustain competitive advantage. Organizations may have to explore outside their own boundaries to successfully gain the resources required (Rosenkopf & Nerkar, 2001). Specifically for business models in developing markets, the lack of resources has been associated with greater need to embrace entrepreneurship for successful operations (Malik & Aggarwal, 2012). Lumpkin and Dess (1996) suggest such entrepreneurial orientation combines autonomy, innovativeness, risk taking, proactiveness, and competitive aggressiveness. One of the highest costs faced by healthcare organizations is labour expenses coupled with a large shortage for trained healthcare professionals (Christensen et al., 2000; KPMG, 2012; Macdonnell & Darzi, 2013). Human resources hence, become an integral part of frugal innovation, especially in healthcare services as opposed to than healthcare products. Examples like Aravind Eye Care and LifeSpring Hospital have been used as case studies on the basis of the entrepreneurial spirit of their human resources and their efficient processes to optimize human resource efficiency (Bound & Thornton, 2012; KPMG, 2012; Macdonnell & Darzi, 2013; S. K. Singh et al., 2012).

Research sub-question 2: To what extent could organizations in developed markets acquire, configure or leverage capabilities that might enable frugal innovation?

2.4.3. *Navigating and influencing the regulatory environment*

Regulatory and other institutional support is an important factor influencing the introduction of new business processes. There are certain advantages that can be taken from a weak regulatory environment – fewer of restrictions, lower regulatory fees and less complex legal processes (Malik & Aggarwal, 2012). Successful healthcare providers may need to build strong relationships with governments and act to shape regulatory environments to suit their needs (ibid.). Current healthcare regulators, such as the FDA, have stringent policies on new product approvals and high registration fees for processing innovations. However, the interaction between frugal innovators and regulators may well involve complex power dynamics that balance “safety and technological standards; clinical and social outcomes; and consumer/user information” and choice and is poorly understood (Faulkner & Kent, 2001, p. 895).

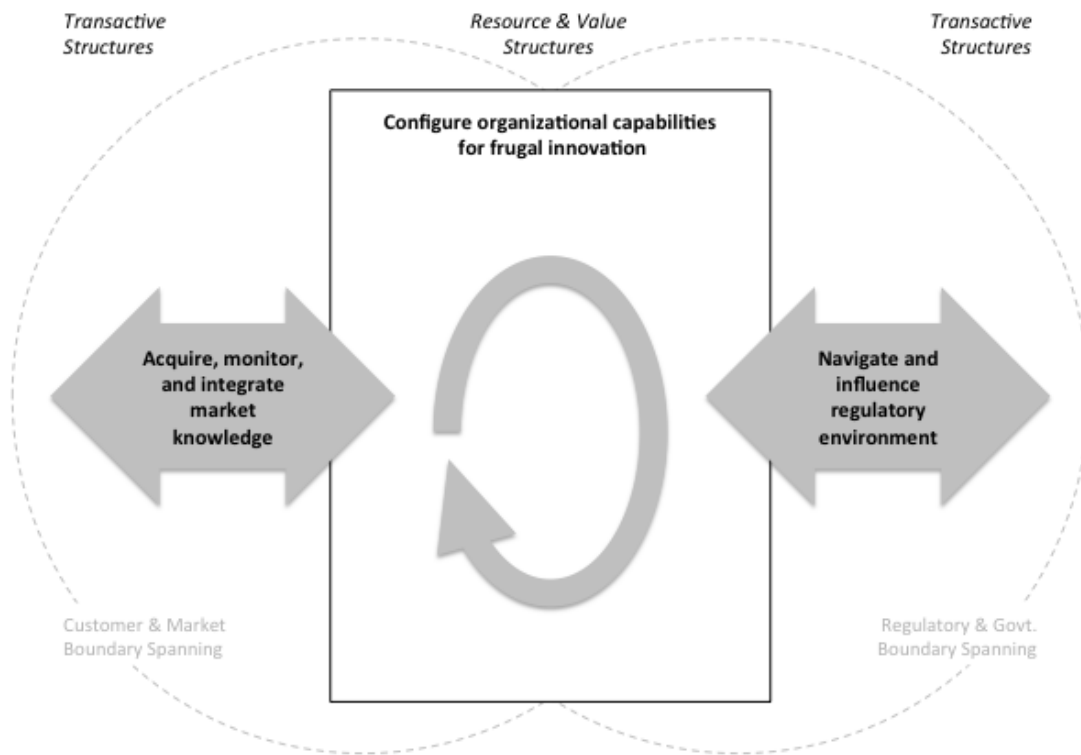
Research sub-question 3: To what extent can healthcare organizations in developed markets navigate or influence regulatory constraints to avoid barriers to frugal innovations?

The conceptualization of dynamic capabilities suggests that successful healthcare organizations must act to develop and deploy new capabilities that allow them to understand, adapt, and participate in the co-evolution of markets for frugal innovation (K. M. Eisenhardt & Martin, 2000; Kor & Mesko, 2013; Stadler et al., 2013). For healthcare in particular, organizations must leverage existing assets or acquire new relationships to navigate compliance and regulatory practices in a similar co-evolution of regulatory environments (See Figure 3). The three questions that have been posed highlight particular aspects of dynamic capabilities, reflecting *transactive* structures involving boundary spanning routines with key stakeholders, customers and regulators, together with internal focus on *resource* and *value* structures (George & Bock, 2011). These perspectives will be utilized to assess the extent to which frugal innovation models might be adopted in developed world contexts.

2.5. Positioning the initial conceptual framework

<INSERT FIGURE 1 ABOUT HERE>

Figure 1 Initial conceptual framework



3. Methods

The research deploys an abductive multiple case study method (Dubois and Gadde, 2002) by conducting empirical fieldwork that to some extent parallels the theoretical conceptualizations of this study. The abductive approach illustrates a more precise picture of the cumulative research process which is interwoven with the development of concepts and empirical findings of this research. Innovations in the healthcare industry are constantly shaped by social actors in the industry and the wider (regulatory) environment, and it is assumed that an in-depth enquiry is required that to a large extent cannot be quantified. It is highly individualistic in nature and each case requires a customized approach and understanding. Thus, phenomena are investigated in their natural context, generating rich datasets which are particularly important for the measurement of complex and intangible phenomena (Suddaby, 2006).

3.1. Data collection

Data collection was executed in two distinct, yet interrelated, samples. Sample one aimed at confirming the process of frugal innovation in developing markets and interpreting theory based on the empirical evidence collected. Sample Two of the research includes data collection in developed markets in order to compare with findings from Sample One and to highlight capability differences. Sample One of the study is based on eliciting an understanding of the process of frugal innovation in healthcare organizations in developing countries. The study sample chosen comprised of companies, hospitals and healthcare service providers using frugal innovation as part of their business model. These were shortlisted based on cases on frugal innovation presented in current literature and existing research databases (Bound & Thornton, 2012; KPMG, 2012; Singh et al., 2011; Singh et al., 2012; WHO, 2012a). All interviewees were chosen from organizations who self-identified with the definition and concept of frugal innovation and included personnel from Aravind Eye Care and LifeSpring Hospitals in GE Healthcare. *Sample One* from the developing economies of India and Malaysia comprised of eight interviews covering six different healthcare organizations, these ranged from established frugal innovation providers e.g. Avarind Eye Care Systems and hospitals e.g.

LifeSpring Hospital to newer healthcare organizations e.g. Mobile Medical Vans. Personnel interviewed were from senior, decision-making roles as well as those who were involved in establishing the frugal innovation business model. Sample Two of the data collection compares results from practitioners in developing world context with related practitioners in more mature economies (i.e. USA, UK and Canada). As there are limited examples of such organizations, the sample for the second part has been chosen on the availability of subjects and recommendation of early interviewees on a snowball method (Bryman & Bell, 2007). Here, the sample comprised of personnel in the healthcare industry in developed markets working in either a hospital, private practice, healthcare equipment manufacturing, healthcare services or organizations undertaking healthcare research and development. Sample Two consisted of eight interviews from the developed world comprised of representative organizations from Canada, UK and USA. Organizations from these countries comprised clinics, equipment suppliers, and projects focusing on non-cosmetic healthcare. GE Healthcare was provided representatives from both USA and Malaysia operations. All respondents consider themselves to be in a decision-making capacity in their organization. A further case study is derived from secondary materials provided by GSK on global strategy for access and innovation in healthcare (GSK, 2014a).

Overall, 16 semi-structured interviews of up to 60 minutes each were conducted – eight in developing markets and eight in developed markets (Appendix A). Interviews were conducted with senior personnel who were largely involved in the initial setting up of the organizations, where requested data were made anonymous. The final sample size exceeds previous studies such as Zeschky et al. (2011) who canvassed six organizations undertaking frugal innovation processes. Interview questions were focused around the innovation process, context, barriers and success factors. At the beginning of each interview, the respondent was given a short brief on frugal innovation in healthcare, relevant examples and contextual background. Some of the prepared questions were: What are the motivations for the market in healthcare frugal innovation?; What are the critical factors which enabling success in frugal innovation?; What were the main barriers or challenges for healthcare of this type? How can these be overcome?; How does the external context affect successful operations e.g.

government, technology, regulation?; and How would the same frugal innovation function in a developed country?. Interviews were taped and transcribed, whilst the confidentiality of participating organizations and individuals was assured. Interview data reliability was further strengthened through triangulation of data sources including secondary sources such as company documentation and reports. In order to address construct validity, this study deployed different remedies: using multiple sources of evidence, establishing a chain of events, and having key informants review individual case reports (Gibbert et al., 2008). Discrepancies between different informants were addressed by triangulating primary interview data with secondary data sources from company and government reports. In addition, draft case reports were sent to key informants to clarify and address any occurring discrepancies.

3.2. Data analysis

The data was open, axial and selective coded, summarized and displayed in an iterative fashion (Miles and Huberman, 1994). Codes emerged from the conceptual review and the interview process, and were subsequently revised during the actual coding process. Specific coding included, for instance, named capabilities, resources, and routines for external engagement. Our analysis included broader codes such as case company background information and more specific codes zooming in on our concepts under study. Data were analyzed by thematic coding by two independent coders and important findings were confirmed and discussed. The empirical findings were compared with the theoretical framework to explore if conceptual and observed patterns matched (Yin, 2003) and we subsequently position a revised conceptual framework to inform theory and practice. Our understanding of the relationships between our concepts emerged iteratively from an evolving literature review and empirical data analysis. In line with Pettigrew (1990), we maintained a data analysis process comprising three sub-processes, namely data reduction to focus on key concepts through selective coding, data display to explore relationships between categories and codes (i.e. axial coding), and conclusion drawing and verification to simplify and make sense of our complex datasets. The repetition of information and consistent verification of our understanding during data collection and interviews was an indication that we had reached saturation.

4. Findings

This section presents the findings from the interviews in developing and developed markets for each of the three research themes addressed.

4.1. Acquire, monitor, and integrate market knowledge

4.1.1. Frugal innovation in developing markets

The first theme emerging from interviews in developing markets was the motivation behind frugal innovation and why this market exists. The primary driver behind frugal healthcare innovation was firmly anchored in the need to serve society, and to provide access to healthcare services to those who might otherwise be not served. Respondents suggested that they sought out this opportunity because they believed that it was a profitable venture, demonstrating a more rigorous assessment of market knowledge. It was stated that responsibly supporting pertinent health and social issues, was foundational to commercial success in developing markets, as it helped build market presence. However, this was seen to be impossible through charity or government funding alone, and profitable commercial ventures were needed for health services to be sustainable over the long term.

"We were all doctors from Government hospitals. We knew exactly what was lacking in eye care in rural areas. They were being made to choose between very poor service and very expensive service...To cater to this huge unmet need, we started Aravind. To provide community service without it being a charity was our dream." (Case 1)

4.1.1. Frugal innovation in developed markets

Most respondents in developed markets had heard of the term frugal innovation before, however clarification of the concept was needed and some found it challenging to place in developed world context, sometimes demonstrating considerable resistance to the ideas. *"In Canada, they want the high quality, standard, trusted healthcare services ... I don't think [frugal innovation] can be started in Canada successfully. It is already cheap for the citizens, why would they bother with such processes" (Case H)*. When developing the conversation further, several respondents believed that frugal innovation had significant benefits for the future of

healthcare in developed markets. However, there was very limited evidence that participants had yet engaged with acquiring market knowledge. *"The healthcare system in the UK will not be able to support its high costs in the near future ... Needs a radical change inspired by the innovations used [in emerging world] to make ends meet"* (Case E). *"It could be a very significant paradigm shift. Needs a change in exposure and awareness - we need to open our minds. Will take time and effort ... maybe going out and understanding what is going on in Asia and other countries and trying to see how we can implement them internally"* (Case A).

Further, there appeared to be significant dissonance between organizational perspectives on customer needs and demands. This further suggests a lack of engagement with understanding the market in the develop world. *"Quality is the biggest factor! Our business is risky ... if the quality is poor, it will not do. Besides, aesthetics are very important for the customer too! Our customers will not buy anything that looks sub-standard"* (Case B). *"It is not the patients [that challenge frugal innovation] ... it is the healthcare organizations and the healthcare systems that have not made room for such innovations to thrive"* (Case D). Despite the level of disparity demonstrated between perspectives, four respondents suggested that their organizations were considering evaluating such models to address their own cost challenges.

4.2. Configure and leverage organizational capabilities for frugal innovation

4.2.1. Frugal innovation in developing markets

All organizations interviewed from developing contexts attributed the success of their frugal innovations to a few critical organizational capabilities. For some of these organizations, like Aravind Eye Care and LifeSpring Hospitals, these capabilities have been the basis of their business model. For others, like GE Healthcare, these capabilities have been developed over time to meet growing needs of the market and for sustained competitive advantage. Apart from having to be cost and process efficient to survive in a BoP market, another perspective was brought forward by one interview. In their view, the value for life is lower in developing nations because of the large population. Possibly suggesting, healthcare providers have less time and resources for their patients, apart from simply treatment and medication. LifeSpring, a maternity care hospital, made a different approach to this their competitive advantage with aims to *"treat women with dignity... This makes them come back to us and trust us"* (Case 7).

GE Healthcare suggested they were the first multinational in the healthcare space that not only observed the need for such innovation, but had the agility to act on it as well. *"[For] India and China, we knew that our costs had to be much lower to succeed in these markets. They have zero support from the Government. We saw the need, we had the capabilities! We addressed it locally with R&D and manufacturing in India itself. This is the only way it has been possible."* (Case 4)

~~*"Poverty is a vicious cycle in India. Without frugal innovations, they have to pay so much more. They get pushed back into poverty... We have developed our own methods. It serves them and keeps us profitable as well!"*~~ (Case 7)

All the respondents agreed that standardization was extremely difficult in countries like India, Malaysia and Indonesia. With majority of the population residing in villages, healthcare services to them cannot be provided through large centralized facilities. Flexibility and mobility was seen as the solution to these problems e.g. mobile eye-car vans where clinicians travel to those in need (Case 2).

4.2.1. Frugal innovation in developed markets

Respondents in developed markets were questioned about processes and organizational flexibility, focusing on their ability to acquire or configure new capabilities required for frugal innovation. Considering accommodating variations for specific customer groups, the respondents from developed nations largely rejected this. The focus of attention was on standardized offerings with little tolerance for different levels of service or alternative healthcare treatments. This was particularly strong from the Canadian participants, who suggested that non-standardized treatments would be best delivered offshore through medical tourism. *"Nobody will accept products that are not standardized and do not look professional. Neither the patients, nor the companies and definitely not the regulators"* (Case F). *"People go to countries like India where healthcare is much cheaper. Also, many other options of healthcare are available there"* (Case H). According to UK respondents, it would be very difficult for a process driven organization like the NHS to bring about such radical change in their system. Organizational rigidity and lack of entrepreneurial thinking were suggested as barriers to any such change. *"[NHS is] very process oriented and rigid...frugal innovation cannot be introduced at that level. Smaller organizations and start-ups are much more equipped to take on something like this"* (Case E) *"[NHS is] too conditioned to their existing model to bring about such a big change on a large scale"* (Case D).

The respondent from USA similarly quoted that *"they would have to create their processes from scratch. It is a mammoth process oriented organization ... needs a lot of effort to change that"* (Case B). Respondents also identified a lack of top management buy-in for the level of process reengineering needed for frugal innovation *"The healthcare system is so complicated. Not easy to start something so different in such an industry"* (Case H). When questioned about focus to allow their current operations to be more lean and productive, most respondents were concerned about inefficient processes and administrative burden for healthcare professionals. When discussing practices used in the developing world they felt that considerable effort and investment would be needed to change practices and bring their costs down e.g. *"the costs will be very high to change our business models from scratch"* (Case F). Further, considerable lead-time was expected before efficiencies translated into lower costs

for patients. "[We] are already running training programs where they are training potential students to take up simple jobs, freeing up doctors to do more complex things ... [but] the change is slow" (Case C).

Most respondents felt that post-GFC budget constraints represented a new challenge and that they were largely unprepared for more entrepreneurial means to provide solutions. Whilst entrepreneurship was seen to be apparent in developing markets, it was seen to be absent or undesirable in developed world healthcare contexts e.g. "*India has so many entrepreneurs because they have always needed to make ends meet ... [America] always found outsourcing an easier option than finding cheaper ways to do it ourselves*" (Case B). Further responses on this topic were more disparaging on the potential for entrepreneurship: "*Frugality does not come naturally to us when talking about healthcare....it has always been an expensive industry*" (Case H) "*We have the government! We have insurance! Why would we bother with such practices?*" (Case G). However, respondents from USA asserted that this attitude was slowly changing with efficiency becoming the key strategy for their organizations. One respondent provided the insight that organizations in developed markets have historically focused on technological efficiency rather than human resource efficiency. If more focus was given to increasing human resource efficiency, then many positive changes could be brought about. "*We are already looking at making processes in house rather than outsource them. Learnt this from the Asia model and found it to reduce costs*" (Case A).

4.3. Navigating and influencing the regulatory environment

The dynamic capabilities framework adds to the traditional competitive advantage frameworks by encompassing boundary spanning with enabling and constraining actors like regulators, supporting institutions and networks (Teece, 2007).

4.3.1. Frugal innovation in developing markets

According to all respondents, the regulatory frameworks in developing nations are highly influential for frugal innovation. The non-standardization of healthcare services available in these countries gives organizations the freedom to undertake a large number of unorthodox practices, many of which fall under the umbrella of frugal innovation. Though laws do exist,

there are limitations in the extent to which they are implemented or enforced. This poses both an opportunity and a challenge for larger organizations. According to the respondent from GE Healthcare, there are major issues regarding patents and intellectual property rights. *"Complicated legal procedures prevent us from taking action against anyone who copies our equipment ... we do not face such problems in our [developed world] operations"* (Case 3). Respondents believed that there were unique characteristics of emerging markets that made it difficult to implement frugal innovations elsewhere: Trust in frugal innovations by the customers, application of entrepreneurial spirit, and the leverage of philanthropy are features that respondents believed cannot be replicated e.g. *"The situation here is unique. India loves Jugaad! We could never achieve what we have in any other country"*(Case 8).

4.3.1. Frugal innovation in developing markets

When questioned about regulatory approval for frugal innovation in developed world healthcare, all respondents identified this as the most significant barrier. There was only limited optimism from the respondents about being able to bring a slow change to the regulatory system. *"Something as different as frugal innovation needs an overhaul of the entire regulatory system"* (Case B) *"if we involve them (regulators) in the process, then they might support it. It needs to be integrated ... Will it happen? I would say difficult...very difficult!"* (Case A). Another respondent from the UK felt that politics was the most important factor in healthcare regulations. If the political agenda were to garner votes through more accessible and affordable healthcare, then regulators will support any innovation that helps win votes from that direction. Regulatory costs are another main barrier for new innovations in these markets. A respondent from USA who is a radiologist pointed out that it takes a large sum of money to register any new product with regulatory bodies, hampering even his own organization from innovating. Legal costs are also very high in case of any mishap while establishing innovations.

Overall, it might be concluded that developed market participants demonstrated considerable resignation to existing institutional frames and failed to demonstrate proactive engagement with regulatory barriers.

4.4. Further challenges for the adoption of frugal innovation in the developed world

Amongst the larger organizations questioned, there was considerable focus and attention on incremental process efficiency as discussed in literature around *lean healthcare*. e.g. *"Just requires companies to identify where they are inefficient and streamline"* (Case B). This perhaps reiterates earlier discussions on the failure of organizations in the developed world to engage fully in the more radical redesign and adoption of meta-capabilities needed for frugal innovation.

Most respondents identified lack of entrepreneurial leadership and in-efficient business models as endemic in mature markets. However, few of the organizations appeared to be attempting to nurture such behaviors in their own organizations. *"Entrepreneurial leadership is the key. Right now nobody is ready to take on the challenge of introducing something so radical. Big organizations won't do and small ones can't"* (Case B). *"[In emerging markets] all the factors combined have been conducive to frugal innovation. The developed markets...will not be able to incubate something like this on their own. It is not in their nature"* (Case E).

<INSERT TABLE 3 ABOUT HERE>

TABLE 3 – SUMMARY OF FINDINGS

Meta-capability	Critical organizational capabilities in developed markets	Critical organizational capabilities in developing markets
Acquire, monitor, and integrate market knowledge	<ul style="list-style-type: none"> • “In the healthcare industry here, there are two main camps – one that does it to make money, and the other that does it for the service of the people. The two camps cannot cross paths” (Case C) • “India has so many entrepreneurs because they have always needed to make ends meet. They have been ready to accept products that are simple. This was not seen as much in America” (Case B) • “...need examples to understand the concept properly. Have read about it recently but not seen any such examples in Canada as yet” “People and government in Canada are not even looking for cheap options” (Case G) 	<ul style="list-style-type: none"> • “Looking at the likes of India and China, we knew that our costs had to be much lower to succeed in these markets...We saw the need... we had the capabilities! (Case 4)
Accommodate variations for specific customer groups	<ul style="list-style-type: none"> • “Nobody will accept products that are not standardized and do not look professional. Neither the patients, nor the companies and definitely not the regulators.” (Case F) • “People in USA have high expectations. In the west, anything produced in developing markets is considered sub-standard by the audience. Hence, quality and trust will be the biggest factor” (Case B) • “For personal healthcare, nobody looks for cheaper options. Everything is covered by the government, otherwise it is natural for citizens to cross the border and get treated ... where some of the services are cheaper.” (Case G) • 	<ul style="list-style-type: none"> • “You cannot expect them (villagers) to travel for miles to come to a hospital for a minor treatment. They ignore their medical problems. We take a basic hospital to their doorstep. Preventing deaths because of easily curable diseases is the least we can do.” (Case 6)
Enable cost-sensitive services	<ul style="list-style-type: none"> • “[We] are already looking at making processes in house rather than outsource them. Learnt this from the Asia model and found it to reduce costs” (Case A) • “India has so many entrepreneurs because they have always needed to make ends meet ...[America] always found outsourcing an easier option than finding cheaper ways to do it ourselves.” (Case B) • “They [NHS] are too conditioned to their existing model to bring about such a big change on a large scale.” (Case D) 	<ul style="list-style-type: none"> • “We knew that we could not rely on the existing American model. Research and manufacturing had to be ...created in India. This is how we have maintained costs.” (Case 4) • “After diagnosis, we identify exactly what treatment is required and how much manpower will be needed. We have more nurses than usual. They are cheaper resources but can handle many tasks.”(Case 7) • An important thing here is that we did not make a cheap copy. The philosophy was always to make something original. Our product was better suited to these markets and so much more cost effective. That is where we found success.” (Case 5)

Meta-capability	Critical organizational capabilities in developed markets	Critical organizational capabilities in developing markets
Secure and improve access to resources	<ul style="list-style-type: none"> • “See the way resources; especially the doctors’ and nurses’ time is wasted in the UK ... silly things like fill up forms and other formalities that can either be done by less qualified people” (Case E) • “Maybe partnering with smaller local companies is the key to see how they adapt nimbly. The public health system does not have the capabilities to take on this sort of expansion.” (Case A) • “The key is to find workforce which is actually below the pay grade, train them and then pay them in the right pay grade ... This is what India has done ... Trained common people to do simple things, and then gave them a livelihood” (Case C) 	<ul style="list-style-type: none"> • “The equipment we manufacture was only available through imports 9 years ago. The price was very high but the benefits were huge. Through experiments conducted my medical students here in India, I found that a better product could be created here at less than half the cost. This was only possible because of the non-traditional materials used. Of Course! All big companies bought from us!” (Case 5) • “Our collaborations have been an enormous strength! Be it Wipro in India or the local bodies in Malaysia and Indonesia, the network is required for frugal innovation to succeed. I feel, collaboration is the way forward in this industry.” (Case 4)
Navigating and influencing the regulatory environment	<ul style="list-style-type: none"> • “Regulations are the main problem. Has taken 3 years to just get initial approvals for his idea ... Small start-ups get support, but have to put up a very strong case to get approvals. Even then, the time taken is long and process is tedious” (Case E) • “The FDA ... are too rigid and have stopped innovation in the healthcare sector to a large extent. FDA has gone too far with the regulations and straightjacketed everyone...small companies cannot innovate. Bigger companies do not want to run the risk” (Case B) • “if frugal innovation has to be accepted, it will not be by the business models who want to make money ... there are regulations which make it difficult for things like this to succeed” (Case C) • “Something as different as frugal innovation needs an overhaul of the entire regulatory system” (Case B) • “If we involve them (regulators) in the process, then they might support it. It needs to be integrated.... Is it possible? Yes! Will it happen? I would say difficult....very difficult!” (Case A) • “Regulatory cost is another big barrier. In a system that is dependent on the government and insurance companies, it is very difficult to sell the story of low cost. Organizations might even try, but they would not be willing to take the risk with regulators” (Case G) • “The healthcare system is so complicated. Not easy to start something so different in such an industry” (Case H) 	<ul style="list-style-type: none"> • “Regulation means nothing to us. Regulators themselves can be made to change their stand. I have seen that.” (Case 8) • “If our innovations cannot fit into the requirements of such old regulations, that does not mean that we stop...We will innovate and find a way around the system.” (Case 8) • “At GE, we have won awards for our innovations in India and Indonesia...in the US market. They [FDA] would never allow it. I have flexibility here.” (Case 4)
Further challenges for developed markets: Efficiency and Lean Healthcare	<ul style="list-style-type: none"> • “Internal process efficiency is a good idea anyway, does not need to be as extreme as frugal innovation ... if organizations are not convinced about the need for such innovations then they will not be successful.” (Case H) • “Just requires companies to identify where they are inefficient and streamline. ... All [management] consultants are preaching the same thing! Efficiency!” (Case B) 	NA

Meta-capability	Critical organizational capabilities in developed markets	Critical organizational capabilities in developing markets
<p>Further challenges for developed markets:</p> <p>Capacity for Organizational change</p>	<ul style="list-style-type: none"> • “Entrepreneurial leadership is the key. Right now nobody is ready to take on the challenge of introducing something so radical. Big organizations won’t do and small ones cant.” (Case B) • “The consumers are always ready for anything low cost! As long as it meets the right standards. It’s the industry that is not ready for such innovations.” (Case C) • “[In India] All the factors combined have been conducive to frugal innovation. The developed markets can only copy the model; they will not be able to incubate something like this on their own. It is not in their nature.” (Case E) • “... social enterprise is a better model to look at, since that does not come under the radar of commercial healthcare” (Case C) 	<p>NA</p>

4.5. GSK's strategy for frugal innovation in global markets

This section presents the findings from a single in-depth case study of GSK global operations crossing both developing and developed markets. This analysis follows a recent announcement of "targeted investments of up to £130 million... contributing to the development of home-grown capabilities and skills in Africa" (GSK, 2014b, p. 1). In April 2014, GSK used the opportunity of Responsible Business Week³ to share details of its *evolving business model* for improving access and affordability in healthcare (GSK, 2014a). The model can be seen to clearly demonstrate ambitions for frugal innovation in global healthcare.

GSK's proposal demonstrates many of the capabilities identified in the earlier findings with a high degree of integration between local and global aspects of the organization. "*The company is built on two fundamental pillars innovation and access...[We aim to make] our products available to the widest audiences...irrespective of where they live and their ability to pay...We are trying to implement a global strategy...but take a very tailored approach to each [country]...they are all very different and at different stages economically [and] socially*" (Senior Vice President Communications and Government Affairs, GSK).

4.5.1. Acquire, monitor and integrate market knowledge

The strategy for GSK involves a considerable investment in market awareness, including dedicated roles, partnerships, and sponsorship of health workers to extend boundary-spanning capabilities of the organization. "*We have to listen we have to be part of society...Our general managers are the key interface with government and payers on the ground...a listening interface in the market... they reflect [findings] into the organization*" (Senior Vice President Communications and Government Affairs, GSK).

4.5.2. Configure organizational capabilities for frugal innovation

GSK appear to have strong strategic focus around the integration and leverage of research and innovation capabilities related to knowledge acquisition and production capacity.

³ Responsible Business Week 31st March to 4th April 2014 is a series of events organized by Business in the Community (www.bitc.org.uk) to promote positive business practices and innovations.

Most significantly GSK recognizes the need investment to acquire key resources in local economies, such as developing locally relevant knowledge, skills, and local production. *“By operating local manufacturing sites, we develop the skills and technical expertise of the workforce in these countries and cut down the costs of production and transportation” (GSK, 2013, p. 23).*

4.5.3. *Navigate and influence the regulatory environment*

Unlike many of the other cases examined, GSK appears to more proactive, or at least more transparent, about its interactions with regulators. Published reports show a high degree of interaction, influence, and lobbying of multiple regulatory agencies (GSK, 2013, pp. 47-48). Most notably, are Patient Advocacy Leaders Summits (PALS); these appear to be capacity building forums to develop new skills and expand the policy influence of patient groups. Here GSK is enabling third party governmental influence; alongside it’s own industry and company level regulatory engagement.

A significant feature of GSKs strategy is the emphasis on collaboration and the need to *build symbiotic partnerships* for successful healthcare innovation. In this capacity, GSK have formed some unusual approaches to further their market footprint, for example working with Save the Children on holistic support for community healthcare, and collaborating with Barclays to promote family level micro-health insurance. These partnerships were positioned in discussions as means to expand reach into new markets and build local experiential knowledge. *“Improving healthcare and making it affordable and accessible to more people is a huge challenge, and one that requires a combined effort” (GSK, 2013, p. 7).*

GSK can be seen to exemplify all of the features suggested by our theoretical model, with considerable investment in building capabilities for frugal innovation in healthcare (See Figure 1). One feature apparent in the GSK case, which perhaps sets it apart from the other healthcare organizations studied, is the emphasis on *capacity for long-term planning* considerable focus was made during the meeting of the need to actively engage shareholders in slower returns *“We are by nature a long-term business and to be successful we have to operate to long-term mindset...this isn’t about philanthropy, this about generating returns...in a commercially driven business but in a responsible way (PT)”*. **INSERT TABLE 4 – AROUND HERE**

TABLE 4 – Capabilities for frugal innovation in GSK

Meta-capability	Critical organizational capabilities for frugal innovation ⁴
Acquire, monitor, and integrate market knowledge	<ul style="list-style-type: none"> • We have to listen we have to be part of society. We have to believe in that and respond to society. Many of the [aspects of the business model] come from listening to society (PT). • The key thing to remember as business leader...we have to think how do these decisions give power to voices, populations who are not able to have direct access, contact or discussion with us (AP) • Over the next three years, GSK will partner with charities to help train and upskill 10,000 community healthcare workers across Kenya, Ghana and Nigeria...The investment will be targeted at supporting the most remote and marginalised communities to help address healthcare inequalities (GSK, 2014b) • Strategic commitments: Continue to build a core range of products and formats to better meet the needs of people across the globe, including those less able to access and afford our products. Invest in the development of vaccines that don't require continuous refrigeration, making distribution easier and less expensive (GSK, 2013, p. 9) • To improve access, we employ innovative funding mechanisms and use a flexible pricing approach that is based on a country's wealth and ability to pay, as well as working to improve availability of our products for the people who need them. (GSK, 2013, p. 20)
Configure: Accommodate variations for specific customer groups	<ul style="list-style-type: none"> • One size doesn't fit all... if we applied our business models from the Europe and the US to Africa, it wouldn't work, we wouldn't even get started. Recognizing that, accommodating the needs of the environment, allows a business to start at some level and gain a long-term perspective (AP) • We are trying to implement a global strategy around innovation and access...but take a very tailored approach to each developing market...they are all very different and at different stages economically, socially etc. (PT) • Africa is where the greatest need is... Within our business model we recognized we could not do this alone we did not have the skill set to do this alone nor the resources... We formed many many partnerships (AP)

⁴ Recorded on 4th April, 2014 at The Royal Institution of Great Britain (GSK, 2014a)

- PT = Phil Thomson Senior Vice President Communications and Government Affairs, GSK
- JS = James Shannon Chief Medical Officer, GSK
- AP= Allan Pamba, Vice President Pharmaceuticals, East Africa and Government, Affairs, Africa, GSK

Meta-capability	Critical organizational capabilities for frugal innovation ⁴
<p>Configure:</p> <p>Design cost-sensitive services</p>	<ul style="list-style-type: none"> • If we don't [GSK] bring innovations which actually takes costs out of the system as well as improving the health of patients...we will not get reimbursed (JS) • We have to have a business model that is genuinely delivering innovation...more first in class type medicines...with genuine patient benefits, which generates genuine cost-effectiveness...we have to be seen to be responsive around reimbursements and pricing (PT) • Ultimately, we have to play a very long term game.... businesses get placed in a quarter by quarter reporting cycle forcing [a short term] decision making cycle...What we are pushing back on is that we work in twenty year cycles of innovation and development therefore we must have a business model which responds to that (PT) • GSK is also taking steps to improve and simplify its supply chain with the creation of regional supply hubs that will help ... reduce Africa's reliance on imported medicines, improving the security of supply and reducing production costs and transportation, which in time should help, contribute to lower prices (GSK, 2014b) • We remain committed to improving productivity in R&D so we can develop more innovative new medicines with greater efficiency. The improved efficiencies that we are seeing within our R&D business organization are also enabling us to be more flexible with the pricing of our medicines (GSK, 2013, p. 22). • By operating local manufacturing sites, we develop the skills and technical expertise of the workforce in these countries and cut down the costs of production and transportation (GSK, 2013, p. 23).
<p>Configure:</p> <p>Secure and improve access to resources</p>	<ul style="list-style-type: none"> • We have centralized a lot of functions that enables us to get a much clearer line of sight on what we need to do globally and in [each] market (PT) • The world's biggest public health challenges can only be solved if researchers from different scientific organizations and institutions work together, sharing their knowledge and expertise (GSK, 2013, pp. 17-18) • [Partnerships with academia] brings together the insight and creativity of the academic world, and GSK's drug discovery expertise and tools to translate innovative research into medicines that benefit patients (GSK, 2013, pp. 17-18) • We have centralized a lot of functions that enables us to get a much clearer line of sight on what we need to do globally and in [each] markets...(PT) • [Open Lab] will directly support the training and education of African scientific researchers who will participate in a portfolio of projects, building local expertise, creating a new generation of African NCD experts while instilling a deep vein of 'African thinking' within GSK's own R&D organization(GSK, 2014a) • To support the scale-up of domestic manufacturing and supply, GSK will establish up to 25 academic Chairs at local African universities in related areas such as pharmaceutical sciences, public health, engineering and logistics. These roles ... will be pivotal to ensuring manufacturing capability is locked into the continent to help attract further manufacturing investment (GSK, 2014a)

Meta-capability	Critical organizational capabilities for frugal innovation ⁴
Navigate and influence regulatory environment	<ul style="list-style-type: none"> • Our Patient Advocacy Leaders Summits (PALS) have been uniting patient advocates for more than ten years across different therapeutic areas to discuss health policy, develop new skills and explore ways to expand their influence (GSK, 2013, pp. 47-48) • To address concerns about conflict of interest, we have made a decision as of 2016 we will no longer pay healthcare practitioners speak on our behalf (JS) • For this tiered pricing principle to work [different pricing in developed vs. developing markets] we have got to respect boundaries ...otherwise the whole thing collapses...we try to work with governments and legislation (JS) • [GSK are] partnering with European governments to help reduce the impact of fiscal austerity measures on continued patient access to life-saving GSK medicines (GSK, 2013, pp. 47-48) • [GSK are] working with governments to increase coordination, simplify pharmaceutical registration and improve the registration processes in China, Russia, Taiwan and Ukraine, to address the challenge of regional disparity in access to medicines (GSK, 2013, pp. 47-48) • [GSK] are collaborating with the Partnership for Better Health – a network of healthcare providers, advocates and consumers dedicated to lowering the cost of care through prevention, access and innovation through collaboration. This helps educate policymakers and the public about the need to invest in preventing chronic diseases affecting the USA (GSK, 2013, pp. 47-48) • Lobbying activities by GSK are listed in EU Transparency Register as: "To increase Europe's competitiveness as a location for Research and Development investment (EU, 2014 # 7990322925-77)
Establish symbiotic partnerships	<ul style="list-style-type: none"> • Partnership is essential we know that in today's world... without partners we would not be on the cusp of delivering the first malaria vaccine to Africa...We respect the independence of partners but they are also part of the fabric of GSK (PT) • We have been working with Barclays to develop a micro health insurance product. In Zambia, for a dollar a month when you top up your mobile phone...if your child gets sick you pool the risk...people are shielded from healthcare shocks that would otherwise collapse the family unit (AP) • [GSK and Save the Children] ... we are bring together our resources and our expertise working together to plug the community gaps for children, the malnutrition gap, the health worker gaps, and the medicine gaps...in the spirit of as we grow our business in that that new challenging environment we are also impacting society who today we may not be able to reach through our business but can access through this partnership (AP)
Build capacity for long-term planning	<ul style="list-style-type: none"> • We are by nature a long-term business and to be successful we have to operate to long term mindset...this isn't about philanthropy, this about generating returns...in a commercially driven business but in a responsible way (PT) • Ultimately, we have to play a very long term game.... businesses get placed in a quarter by quarter reporting cycle forcing [a short term] decision making cycle...What we are pushing back on is that we work in twenty year cycles of innovation and development therefore we must have a business model which responds to that (PT)

5. Discussion

This section shall consider the implications for our main research question. Collating the three sub-themes investigated, across the developing vs. developed market distinctions. We shall review initial theoretical framing, and summarize the contributions to our existing understanding of healthcare innovation.

5.1. Capability to acquire, monitor, and integrate market knowledge

Analyses of those practices of frugal innovation in the developing world demonstrate a high degree of market awareness with active mechanisms to understand the consumers' context and preference. These boundary-spanning processes are aligned with those identified in the literature on emerging market innovation (e.g. Acquisition of local knowledge c.f. Kanter, 1999; Mechanisms to observe others c.f. Levesque & Shepherd, 2004). In contrast healthcare organizations in developed countries appear to have limited engagement with such capabilities. Empirical findings suggest that whilst frugal innovation is recognized as a market opportunity, most organizations assume that high quality and aesthetic presentation are necessary for success in their markets (Ferlie & Shortell, 2001; KPMG, 2012; WHO, 2012a).

Reports by management consultancies suggest that customers in developing world might well be open to changes in healthcare delivery: *"90 percent of patients are willing to use a cheaper drug if their doctor explains that it is as good as the more expensive medication"* (Wernicke, 2010, p. 3 from McKinsey & Company), *"transparency and education is required to move beyond assumptions that higher prices...[are] a proxy for quality"* (Report from Deloitte, 2014b, p. 4). Within healthcare organizations in developed world, there appears to be considerable uncertainty about customer acceptance for frugal healthcare innovation, however this doubt appears to be based largely on speculation as most organizations lack means to test this assumption with their direct customer base.

In this respect GSK's strategy can be seen to be distinctive by actively acquiring capabilities to better understand customer healthcare needs globally. The presence of global strategic intent and dedicated local resources to listen and learn from society positions the

organization is well positioned in to monitor and act on developments in healthcare innovation in their target markets (See Table 4).

As identified by Deloitte Health Solutions greater attention to consumers is imperative for the future of healthcare as existing practices are disrupted; *"Innovation will come from providers and health plans satisfying the unmet needs of these consumers, who want transparency, value, and convenience...Greater engagement [is needed] ... to understand the value of the product [customers] are buying and how to use it effectively"* (Deloitte, 2014a, p. 13).

5.2. Configuration of organizational capabilities

Whilst understanding unmet customer needs is crucial to identify potential, organizations must also be able to adapt internal organizational capabilities and have the entrepreneurial drive to adopt frugal innovation in their core processes (Stadler et al., 2013; D. J. Teece, 2007; Yu et al., 2013). Findings from developed market interviews suggest that strong legacy processes drive healthcare organizations in developed nations, and existing routines remain highly resistant to change (C. M. Christensen, Bohmer, & Kenagy, 2000; J. Waring & Bishop, 2010). The respondents attributed this to the sensitive nature of the industry and the focus on collective top-down managerial decisions with limited enablement of bottom-up entrepreneurial drive. Resistance to change in processes, lack of top-management buy-in and risk averseness are some of the key constraints to innovation that emerged through the developed market interviews.

In contrast, the developing world healthcare organizations demonstrated considerable flexibility and agility in integrating new capabilities into organizational routines. Across the cases examined, considerable attention was paid to themes identified in literature: i) To deliver healthcare solutions at specific customer groups at point of need e.g. eye care camps conducted in rural areas (Vickers & Rosen, 2011). ii) To provide highly cost effective services e.g. Jaipur Foot made of low-cost materials like rubber and wood allowing much more flexibility, and made waterproof so that amputees could walk on muddy terrains (Arya & Klenerman, 2008). iii) Acting to secure and improve access to resources e.g. careful use of doctor's time and autonomy for nurses to conduct simpler tasks (Bound & Thornton, 2012).

GSK also appears to be progressive in its approach to organizational configuration and adopting a radically different stance to peers in the developed world. Notably there is recognition in their design for balance between local specific customer groups and global processes for standardization and quality control (See Table 5). GSKs strategy is consistent with advice offered by Deloitte Health Solutions and the concept of glocalization "*thinking globally but acting locally — will move to the forefront in 2014 and beyond. In the face of change and innovation, the ability to reach into global jurisdictions to learn and mitigate the risk of local change will be invaluable. Conversely, trying to apply global solutions to local markets without factoring in local dynamics could be disastrous*" (Deloitte, 2014a, p. 2).

Broadly, these findings suggest severe limitations in the extent to which organizations in developed markets could embrace entrepreneurial approaches and leverage capabilities to enable frugal innovation. Instead the current focus is of minor incremental adoption of efficiency i.e. Lean. Historic dependence on public healthcare system and the legacy of resource abundance has impeded entrepreneurial spirit required for more radical transformation of operating models. With a few notable exceptions, it is hard to imagine existing healthcare organizations in developed nations might acquire and integrate the competence and entrepreneurial orientation needed for a concept like frugal innovation to succeed (George & Bock, 2011; Lumpkin & Dess, 1996).

5.3. Navigate and influence regulatory environments

Regulatory and institutional factors act as a significant barrier to the adaptation of frugal innovation (Christensen et al., 2000). Long processes of regulatory approvals, complexity of the healthcare system, and rigid policies, hamper disruptive innovation in healthcare (ibid.). Generally, it might be observed that organizations in our sample are largely accepting of existing regulatory frameworks and offer little resistance or challenge to current norms. Our interviewees provide strong evidence that organizations are not willing to take the risk of investing in unconventional ideas for fear of expensive, time consuming, and ultimately unresolvable regulatory objection.

Very few organizations in either sample have acquired capabilities to engage with regulatory discourse, considering this to be something impossible for smaller or younger organizations e.g. *"Something as different as frugal innovation needs an overhaul of the entire regulatory system"* (Case B). This might prove to be particularly problematic in the UK, where "Different legislation and inspection regimes apply to health and social care providers in Scotland, Wales, and Northern Ireland...[and] several damning reports on mortality and poor hospital care...[are] leading to increased regulation and provider rating systems" (Deloitte, 2014a, p. 17).

Here again, GSK can be seen to differ in its approach to regulatory matters, as a large multinational corporation (MNC) with experience of pharmaceutical trials, it has established a core competence for navigating multiple regulatory environments. A capability unique amongst those studied in our sample. A perspective on developed world healthcare organizations could be that they have largely nationally bound, and have evolved within one regulatory environment, with limited experience of regulatory practices that might apply elsewhere.

There is some optimism given the fact that regulators themselves are looking for options to manage costs and make healthcare more affordable through initiatives like Obamacare. However, the pace of change may be slow (C. M. Christensen et al., 2000; Ferlie & Shortell, 2001; Hafez, 1997). As observed by Deloitte Health Solutions, much of the most compelling frugal healthcare innovations are enabled by *"weaknesses in the infrastructure, institutions, and resources of emerging markets, [where] entrepreneurs face fewer constraints...[such as] lack of meaningful oversight...They can bypass Western models and forge new solutions."* (Deloitte, 2014a, p. 17) It is apparent that the right balance needs to be maintained between regulations that protect welfare and safety of consumers, yet all flexibility for beneficial innovation. In the words of Christensen et al (2000), *"Government and health care industry leaders need to step forward to help insurers, regulators, managed care organizations, hospitals, and health professionals work together to facilitate disruption instead of uniting to prevent it"*(P. 111).

5.4. Comparison with lean healthcare initiatives

More broadly, our findings highlight the difficulties of translating healthcare management philosophies and approaches developed and established in other industries. Although public and private service increasingly bear many similarities, and in some countries the distinction is even difficult to make, there remain significant areas of difference (Boyne, 2002). This is particular evident in the UK NHS where services have, for over 60 years, operated within the public sector and been characterised by a high degree of political ideology, organizational complexity and the influence of powerful professional groups (Z. J. Radnor et al., 2012).

However, research also suggests the implementation of lean is not without its problems, with the process depending on factors such as organisational readiness, a culture of continuous improvement, effective leadership, the availability of resources and communication strategy (Z. Radnor & Boaden, 2008).

Building upon these ideas, we suggest Lean raises further questions about the social organisation of healthcare. It can be argued, for instance, that while Lean might have appeal in many industrial settings, like other management techniques it may not easily translate into healthcare (Weiner, 2004). For example, how and who should specify the 'value' to be created in healthcare (Young & McClean, 2008), and should we talk of value (in a narrow sense of an individual patient's experience) or values (in a wider sense of collective beliefs about healthcare)? Returning to our wider debates, Lean illustrates the desire of policy makers to reorder clinical work through the introduction of managerial philosophies and techniques.

Lean can be interpreted therefore as a new 'frontier' in the managerialization of healthcare. As with similar developments in clinical regulation, risk management and quality assurance (Justin Waring, 2007) (Waring, 2007; Weiner, 2004) it can be anticipated that the translation of these management techniques from industry to healthcare might have a profound impact on the social organisation of healthcare.

5.5. Positioning a revised conceptual framework for frugal innovation in healthcare

Building on earlier discussions, successful frugal innovation in healthcare may be seen to require the dynamic acquisition and integration of distinct capabilities that are distinct from those leading to incremental improvement in efficiency e.g. Lean healthcare. Further, organizations wanting to achieve a radical evolution in their operating model require: New *transactive* structures i.e. boundary-spanning interactions that acquire market knowledge and influence regulation. New *resource* structures i.e. innovative organizational configurations to deal with resource constraint. And New *value* structures i.e. new routines that create and capture both economic and societal value (After George & Bock, 2011).

From the empirical analysis of the three research questions posed, it might be concluded that most healthcare organizations in the developing world are lacking capabilities necessary to deliver frugal innovation. Were organizations to attempt a more proactive and radical change; then results suggest that a revised conceptual model might assist to prioritize specific dynamic capabilities for acquisition (See Figure 2) (Kathleen M Eisenhardt, 1989; Kathleen M Eisenhardt & Graebner, 2007).

First, *transactive structures* that interact with changing customer needs (i.e. *Acquire, monitor, and integrate market knowledge*) have been identified as a critical enabler for frugal innovation. This meta-capability is consistent with extant literature (For example see: Kanter, 1999; Petrick & Juntiwassarakij, 2011; Yu et al., 2013) and was identified in empirical cases (e.g. GSK). In practical terms this capability requires a degree of engagement with customer and mechanisms to capture knowledge about changing customer contexts.

Second, *transactive structures* that interact with and actively influence institutional regimes (*Navigate and influence regulator environment*) are seen as essential to launch more radical healthcare offerings (Akhtar, 2011; Deloitte, 2014b; Hafez, 1997). Empirical evidence for this claim, exists only with global organizations, however as a major barrier to frugal innovation, such engagement is asserted to be a fundamental efficacy to challenge status quo.

Third, *transactive structures* that foster collaboration allowing access to competence or knowledge (*Build symbiotic partnerships*) were identified by several participants as offering

mutual advantage, particularly for early stages of market entry. Reference to precedent for this capability is limited in extant healthcare literature but is notable in papers researching other sectors of emerging market innovation (e.g. Hart & Christensen, 2002; C.K. Prahalad, 2006, 2012; Yu et al., 2013).

<INSERT FIGURE 2 AROUND HERE>

Forth, considering the *configuration of organizational capabilities*, one *resource structure* and three *value structures* were identified as pivotal to successful frugal innovation in developed economies.

The most pertinent *resource structure* identified in both literature and empirical cases was *securing and improving access to resources*. In practical terms this requires significant investment in supply chain relationships or dedicated local competence, as seen with GSK.

Value structures enabling frugal innovation focus on balancing standardization and customization, designing efficiency into the system rather than retrospectively altering costs, and expanding strategic horizons.

The capability to *accommodate variations for specific customer groups* has significant precedent in literature (e.g.Lim et al., 2013; Petrick & Juntiwarakij, 2011; Zeschky et al., 2011). In progressive healthcare organizations this can be seen to blend efficiency gains of standardized procedures with innovative distribution and communication routines to address variations in customer preference (For example: utilizing mobile eye clinics in Case 2).

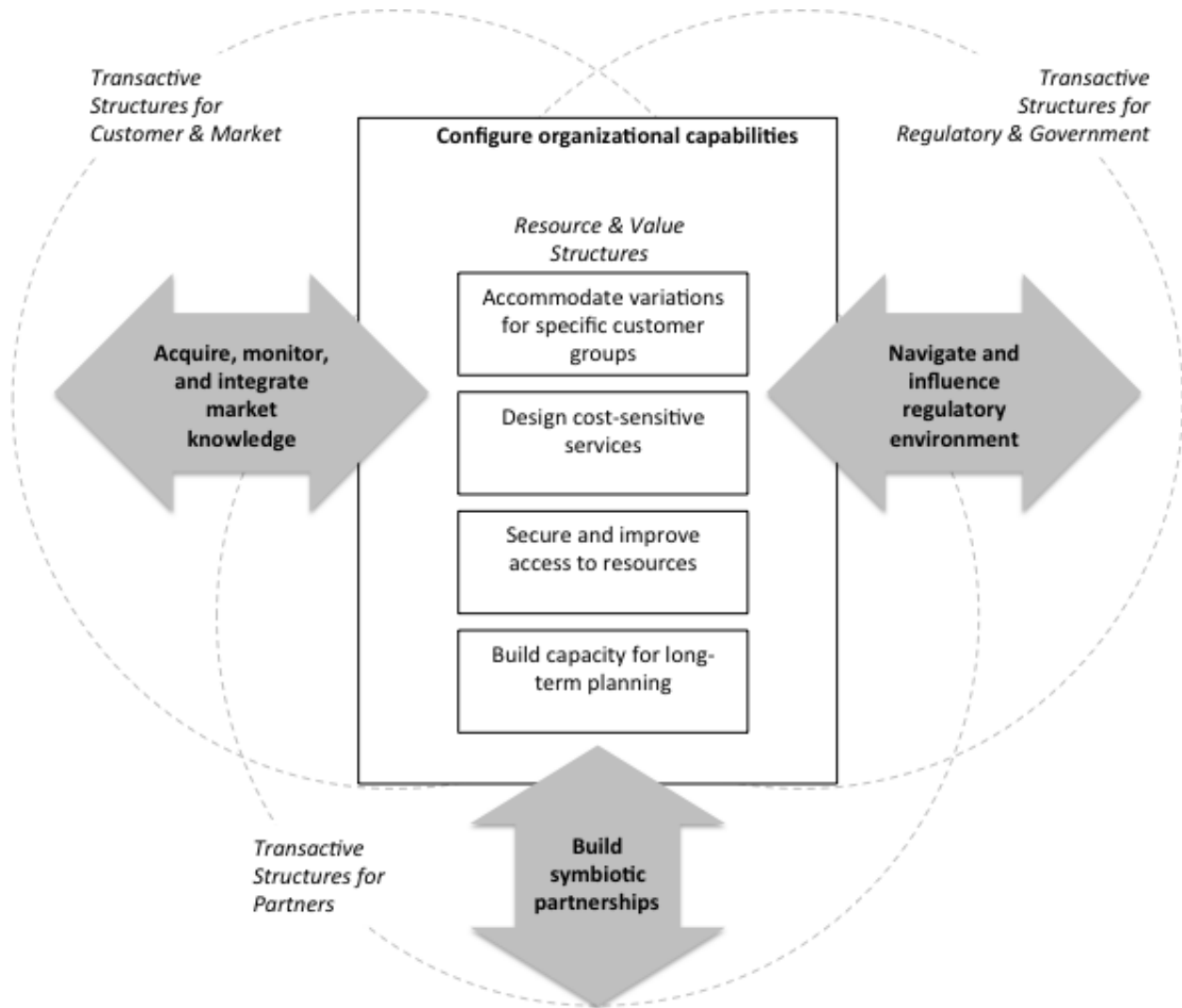
The capability to *design cost-sensitive services* might perhaps be considered the related to lean healthcare initiatives (Joosten et al., 2009; Z. J. Radnor et al., 2012; J. Waring & Bishop, 2010). However, from the empirical evidence gathered, the challenge for organizations in developed nations would be to embrace clean-slate redesign of operating models, rather than incremental process efficiency within existing hierarchical models (Bock et al., 2012).

Building capacity for long term planning may perhaps be the most challenging competence to develop between healthcare organizations at their stakeholders. For commercial organizations this requires sympathetic treatment of returns and performance

metrics (C. K. Prahalad & Hammond, 2002; C.K. Prahalad & Hart, 1999). For public bodies this may mean considerable reframing of government performance targets (Lehoux, Daudelin, Demers-Payette, & Boivin, 2009).

The meta-capabilities identified through this analysis could be seen as daunting for healthcare organizations in the developed nations to undertake at a time when budgets are tight and performance under extremely scrutinized political targets. However, without significant radical shift in operational models it is unlikely that the sector will be dynamically capable to address the challenges of 21st century healthcare.

FIGURE 2- Revised Conceptual Model



5.6. Limitations and further research

This research has explored the capabilities necessary for approaches seen in frugal innovation to be adopted in developed markets, which identifies a meta-capability model for successful adoption of radical healthcare innovation. The limitations of this study may serve as potential future research avenues. First, a limitation of this study may be the limited number of responses in developed nations (USA, UK and Canada). This was due to poor level of understanding of the concept in general, something which could be addressed by greater promotion and attention to frugal innovation with organization such as Nesta. Second, data were collected from senior personnel from large healthcare organizations in developed markets and it did not target small start-ups or social enterprises. It is possible that researching organizational capabilities of smaller more entrepreneurial organizations would have given very different results, an area worthy of future research. Respondents suggested that non-profit organizations and social entrepreneurs might find it easier and more beneficial to explore options like frugal innovation. Given that frugal innovation came about to address a greater social need, it can be considered that these innovations will find a better fit in the social enterprise model that looks at both the social and the economic value of entrepreneurship (Chell, 2007).

6. Conclusions and Implications

This study has set out to understand the potential for learning practices in healthcare innovation from emerging markets and applying them to the growing resource constraints faced by healthcare systems in the developed world.

Healthcare organizations in developing markets have been built to survive with very large patient numbers, inadequate resources and an unstructured regulatory framework. The lack of a systematic, formal healthcare system has encouraged entrepreneurs in developing markets to find unique solutions like frugal innovation. It is not considered a phenomenon in these markets; it is a way of life. This study contributes to the field of frugal innovation in healthcare by extending its boundaries beyond developing markets. The research tested to what extent organizations in developed markets have the capability for new innovations that

will help them address their current problems. This study refines and extends prior studies by identifying whether organizations in developed markets have identified the market for frugal innovation and whether they have the entrepreneurial and organizational capabilities in order to cope with the changing business environment. This research argues that in the current scenario, inflexible processes, top-down managerial approach and rigid regulatory framework limit the potential for healthcare organizations in developed economies to deploy frugal innovation.

"More than one billion people worldwide lack access to a health care system...[AND] 23 percent of U.S. adults ...had serious problem paying medical bills or were unable to pay them"
(Deloitte, 2014a, pp. 4-5)

As the quotes above demonstrate, the extent of the global need for solutions in healthcare is extensive. Whilst progress in the Western world might be slow, examples of good practice (e.g. GSK) are emerging. This study has also identified those organizations are actively seeking alternatives, and some of the capabilities discussed in this paper might offer them a solution to their current crisis.

Healthcare organizations in developed markets have just begun to consider capabilities needed for frugal innovation, and the model positioned in Figure 2, represents a potential roadmap for transition. Participants in this study were enthusiastic of the potential for frugal innovation and hopeful that smaller flexible organizations might attract funds for frugal innovations. Perhaps, the question of whether extant organizations can adapt to frugal innovation might be better answered by considering what types of organization might need to evolve in developed markets to deliver such radical change.

7. Appendix – Interviews with healthcare organizations

Case	Sample One – Developing Markets	Country	Interviewee
1	Aravind Eye Care System	India	Chairman
2	Aravind Eye Care System (LAICO)	India	Executive Director
3	GE Healthcare	Malaysia	Strategic Accounts Director
4	GE Healthcare	Malaysia	Strategic Innovation Manager
5	Equipment Manufacturer (Anon.) ⁵	India	Founder
6	Mobile Medical Vans	India	Principal Scientist
7	LifeSpring Hospitals	India	Head - Process Control
8	Maitri Hospital	India	Owner
Case	Sample Two – Developed Markets	Country	Interviewee
A	GE Healthcare	USA	Director
B	East Meets West	USA	President
C	Innovision Imaging	USA	Founder
D	Research Project (Anon.)	UK	Consultant
E	Frugal Innovation Start-Up (Anon.)	UK	Director Owner
F	Wellcome Trust	UK	Strategic Advisor (Affordable Healthcare)
G	Medical Clinic - Private Practice (Anon.)	Canada	Senior Manager
H	Large Equipment Manufacturing (Anon.)	Canada	Senior Manager – R&D

⁵ All respondents were offered choice of organizational anonymity this is preserved in two cases according to their wishes

8. Appendix - Healthcare organizations in developing markets

8.1. Aravind Eye Care (KPMG, 2012; Vickers & Rosen, 2011)

Situated in the South of India, Aravind Eye Care conducts more than 350,000 eye operations in a single year from eight hospitals. This award winning organization keeps its efficiency high and costs low by catering to the large population at the BoP requiring eye care. In the eye care business, only 20% of the costs are variable. Aravind keeps these costs very low by optimum workforce utilization. Inspired by McDonald's standardized, high efficiency delivery method, Aravind has more than one patient in an operation theatre at one point. While the doctor operates on one, the nurses prepare the next patient for operation. In this way, time is not wasted and more operations can be conducted in a single day. Another method of labor utilization followed is that doctors do not conduct small tasks that can be done by nurses as well. The specialty is that these nurses are recruited locally and trained to be professionals. Eye care camps are also conducted to reach out to rural areas. Apart from this, Aravind locally manufactures and exports lenses for \$2, the lowest price in the world. This model is being replicated by about 250 hospitals in India and efforts in developed markets to adapt this model are being made as well.

8.2. Narayana Hrudalaya (Bound & Thornton, 2012; S. K. Singh et al., 2012)

Founded in 2001 by Dr. Devi Shetty, Narayana Hrudalaya is one of the largest hospitals in the world for cardiac and cancer treatments. An average cardiac surgery here costs only \$2,000, less than 1/12th the price in the UK. The hospital also conducts around 10 free heart surgeries a week for the poor and yet maintains high profit margins. Inspired by Toyota's lean manufacturing processes, Narayana Hrudalaya believes in complete efficiency. The organization runs its own training center, insurance scheme and is aiming to design its own equipment. Like Aravind Eye Care, this hospital too ensures that doctors are free to handle more complex tasks while nurses are given the autonomy to conduct easier tasks like paperwork and preparation for an operation on their own. Apart from India, Narayana Hrudalaya has begun to conduct operations for the NHS as well, at a very low cost. Due to the high quality of medical care provided, this innovation has won many awards and the founder has been dubbed as the 'Henry Ford of heart surgery'. Narayana Hrudalaya has also received funding from global financial giants like AIG and JP Morgan who see potential in the business model.

8.3. LifeSpring Hospitals (Bound & Thornton, 2012; D'Souza, 2012; S. K. Singh et al., 2012)

LifeSpring is a chain of maternity hospitals catering to the 82,000 Indian women who do not receive quality maternity care. Started by a joint venture between the Indian Government, a large private company and an American private equity fund, it is now a chain of 12 hospitals. As maternity care in India is either very expensive or of very bad quality, this hospital provided quality services to the large un-catered middle class population of the country. The maximum cost of a delivery at LifeSpring costs \$150. LifeSpring operates on a high efficiency model exercising practices such as payment by case and very low inventory with a just-in-time supply system. They also keep their capital expenditures low by not buying any of their own land, but by depending on lease agreements. The hospitals are old schools and apartments buildings converted into hospitals. Due to these practices, the first LifeSpring hospital broke even just after 8 months and manages 140 deliveries, 7 times the normal average for any other maternity hospital in India.

8.4. GE Healthcare (Immelt et al., 2009; WHO, 2012)

GE Healthcare has been the pioneer in its field to recognize the commercial potential of frugal innovation. The company launched a \$1,000 handheld ECG machine, a \$15,000 ultrasound machine and a \$3,000 baby warmer capturing the market in China and India. With very basic features, these products were much cheaper than those available in the market. Given their success, GE launched these products in the American and European market as well. These machines were manufactured in western markets but the R&D was conducted in developing markets

to ensure that products being made would survive the adverse conditions of no electricity, voltage fluctuations etc. GE's products are being touted as the breakthrough solution to the growing financial woes of the healthcare industry in developed markets. The company continues to innovate through its 'Healthymagination' program which is evaluating low cost options based on frugal innovation.

8.5. Jaipur Foot (Arya & Klenerman, 2008)

Innovated in 1975, the Jaipur Foot was a breakthrough innovation for amputees all over the world, especially in a country like India. Squatting on the floor is a common practice in India for common activities like eating, praying etc. As homes in rural India do not have chairs, sitting on the floor is their common lifestyle. However, this would be very difficult for amputees fitted with the traditional prosthetic limbs which were too rigid. Dr. P.K. Sethi founded the Jaipur Foot made of low-cost materials like rubber and wood designed in a way that allowed much more flexibility. The leg was made waterproof so that amputees could walk on muddy terrain and in fields as well. All this was possible at a cost of about \$6 and could be assembled in less than an hour. The founder did not patent his innovation as he believed that it would make it commercial and then not affordable for those he had intended it for. The Jaipur Foot is now being used globally in many variations after a few improvisations, trials and standardization.

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