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Frugal Digitalization: A Systematic Literature Review

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Introduction

Information technologies constitute one of the most visible manifestations of change in contemporary society (Faik and al. 2020). Nowadays, firms are constantly under pressure to use digital technologies and adapt their business models to this new reality (Kohli and Melville 2019). Actually, the use of these technologies has redefined organizations, which made digitalization become a buzzword in the business world, and recognized as a way that organizations should take to stay relevant (Goldstein 2015; Spitzer 2014). However, although going digital evokes many benefits, it also requires investments and associated costs (Ahmad and Murray 2019). On the other hand, companies have limited resources especially in the emerging countries. According to Aygerou (2008), a concern that permeates the international security and development center is the condition of severely limited financial resources, technology, and skills in most developing countries or regions. These findings lead us to think for low-cost digitalization called frugal digitalization. Following this proposal, the following research question is formulated: What is the scope of the study of frugal digitalization in the literature? To addresses this research question, we conducted a systematic literature review using PRISMA steps: we started research with the following principle “research articles that combine literature on both frugality and digitalization”. The objective is to identify any understanding about frugality or digitalization or their related terms or any connections between them.

Systematic Literature Review

Literature review is defined by Rowe (2014) as “synthesizing past knowledge on a topic or domain of interest, identifying important biases and knowledge gaps in the literature and proposing corresponding future research directions”. It may have different focus and goals (Rowe 2014; Templier and Paré 2015). Therefore, the main goal of our literature review is to discover the extent of frugal digitalization in literature. We are interested to any aspect of the concept, including frugality or digitalization or their related terms or any correlations that may exist between them. We conducted a systematic literature review following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines proposed by Liberati and al. (2009) and related to the development of the research objective and question, the establishment of research parameters, the extraction and evaluation of the relevant data, and the synthesis of results.

Protocol Selection

The systematic review process was conducted using the four required PRISMA steps (Liberati and al. 2009) of identification, screening, eligibility, and inclusion. In fact, this systematic review is based on the following principle: finding the research articles that combine both frugality and digitalization. Firstly, we searched in the online databases of ebsco, jstor, science direct, sage journals, springer and wiley online library. The used key words were: "Frugal" AND "Digital", "Frugal" AND "Digitalization", "Frugality" AND "Digital", "Frugality" AND "Digitalization". In fact, we only selected recent publications, focusing on those that are published within the last five years, from 2016 to 2021 in the

basket of eight journals as top journals in information system, 50 journals used in financial time research rank and the first category of generalist journals in economics and management, and in information systems as ranked by the French national center for scientific research (CNRS). We found 55 articles in ebsco, 12 articles in jstor, 12 articles in sciencedirect, 12 articles in sage journals, 3 articles in springer and 52 in wiley online library, for a total of 146 articles. Secondly, we eliminated duplicates with NVIVO software: 84 duplicates were identified and 62 articles were retained. Thirdly, the titles, abstracts and keywords of each article were reviewed and we chose only articles that explicitly or implicitly addresses digital or frugality or terms that are linked to them or showed a relationship between them. Frugality and its related terms are those reflect in their meaning cost saving features. The digitalization and its related terms are those based in their meaning on digital. This process provided 31 articles. Fourthly, the 31 articles were fully read to select the eligible ones which will be included in the review: articles which didn't thoroughly explain digitalization or frugality or their related terms or did not emphasize the correlation between the terms were excluded. In the fourth step, only 9 articles were included. Therefore, in an effort to expand the search beyond the 9 articles, we added potentially interesting work using the Go backward and Go forward reviews (Webster and Watson 2002). The Go backward enables us to examine the citations of the 9 articles identified in step 4 then, we determined 3 articles that we should consider. The Go forward using google scholar enables us to identify articles citing the key articles identified in the last step of the selection process, we determined one article that we should consider. Finally, 13 articles retained in this systematic review. The following sections present the findings of the systematic literature review. We propose two lists of terminologies that are used in the included articles. The first set of terms is based on economic characteristics and the second is based on digital. Then we explain how these terms are associated.

Findings

Terms Based on Economic Features

In this systematic literature review, the authors highlighted a variety of terms that exhibit the characteristics of an economic choice. They defined terms such "frugality," "bricolage," "jugaad," "financial responsibility" and "moderation," (Table 1).

Terms	Authors	Quotes from included articles
Frugality	Lastovicka and al. (1999)	Frugality is a unidimensional consumer lifestyle trait characterized by the degree to which consumers are both restrained in acquiring and in resourcefully using economic goods and services to achieve longer-term goals (Lastovicka and al. 1999).
	Wirtz and Zeithaml (2018)	"Frugality – We try not to spend money on things that don’t matterto customers. Frugality breeds resourcefulness, self-sufficiency and invention " (Stone 2013 p:330).
	Ahuja and Chan (2019)	Affordability, inclusivity, and simplicity are frugal principles (Radjou and Prabhu 2014).
	Drolet and al.(2021)	Frugality assesses tendency to be a careful steward of one’s own resources (Lastovicka and al. 1999).
Bricolage	Garud and karnoe (2003)	Following (Lvi-Strauss 1967), we use the term bricolage to connote resourcefulness and improvisation on the part of involved actors (Miner et al. 2001).
	Shepherad and al. (2020)	Bricolage represents actions individuals take that generate creative solutions in resource-constrained environments (Baker and Nelson 2005; Garud and Karnøe 2003).
	Busch and Barkema (2021)	Bricolage is about questioning resource constraints and utilizing what is at hand (Baker and Nelson 2005; Halme and al. 2012; Perkmann and Spicer

		2014).
Jugaad	Basu and al. (2013)	Jugaad engineering focuses on utilizing makeshift materials that are available in the context of extremely limited resources (Tiwari and Herstatt 2012).
	Shepherd and al. (2020)	Jugaad involves making do with whatever resources that are accessible (Birtchnell 2011; Prabhu and Jain 2015) and overcoming constraints (Gulati 2010; Krishnan 2010; Rangaswamy and Densmore 2013) to improvise a frugal quick-fix solution(Prabhu and Jain 2015; Radjou and Prabhu 2015; Singh et al. 2012).
	Busch and Barkema(2021)	… jugaad ("make do" in Hindi) …(Busch and Barkema 2021).
Financial responsibility	Yoon (2017)	Highly financially responsible people are known to be disciplined (Lastovicka and al. 1999) and could be more socially exclusive.
Moderation	Drolet and al. (2021)	Moderation is defined as a characteristic of individual alternatives included in the chooser's current, salient choice set or consideration set (Drolet and al. 2021).

Table 1: Terms Based on Economic Features with Corresponding Definition from the Included Articles

Although frugality is defined in the included articles, authors such as Basu and al. (2013); Anand and Barsoux (2017); Luan and al. (2019); Shepherd and al. (2020); Stocchi and al. (2021); Busch and Barkema (2021) cited it without providing a definition. In addition to the terms listed in Table 1, authors used other terms in this systematic review but did not define them namely:

- Cost-effective with Ahuja and Chan (2019); Basu and al. (2013); Bouayad and al. (2020); Busch and Barkema (2021); Garud and karnoea (2003); Wirtz and Zeithaml (2018).
- Low cost with Ahuja and Chan (2019); Basu and al. (2013); Bouayad and al. (2020); Busch and Barkema (2021).
- Saving with Yoon (2017); Wirtz and Zeithaml (2018); Lastovicka and al. (1999); Garud and Karnøe (2003); Drolet and al. (2021); Bouayad and al. (2020).
- Cost saving with Wirtz and Zeithaml (2018); Bouayad and al. (2020); Basu and al. (2013).
- Cost aware, cost sensitive, cost reduction and cost transparence with Bouayad and al. (2020).

The same logic was used for the terms-based on digital.

Terms-Based on Digital

In the included articles, the authors identified various concepts regarding digital. For example, Garud and Karnøe (2003) presented technology as Rosenberg (1982 p:143) defined it "knowledge of techniques, method, and designs that work, and that work in certain ways and with certain consequences, even when one cannot explain exactly why." Anand and Barsoux (2017) highlighted the common misunderstanding of digital transformation; they explained that "executives increasingly use the term «transformation» as shorthand for «digital transformation» But the ongoing digital revolution does not itself constitute a transformation it is a mean to an end, and you must define what that end should be". They clarified the term of digital; they cited that going digital can support any of the five quests namely global presence, customer focus nimbleness, innovation and sustainability, and all of them call for discipline. Wirtz and Zeithmal (2018) clearly detailed technologies; they showed that "services can be industrialized using hard technologies (e.g., machines, tools, and artifacts), soft technologies (e.g., preplanned service systems), and hybrid technologies (Levitt 1976)". Ahuja and Chan (2019) defined technological innovation; they stated that it "represents advancement in technologies that enhance the production of goods and services". They said that "digital innovation results from the digitalization of resources, capabilities,

processes, products, services, and business models". Moreover, they mentioned the concept of digitalization, they noted that "digitalization moves beyond digitization (technical process of shifting organizational resources, capabilities, and processes from analog to digital) and involves additional socio-technical aspects that impact the socio-economic context of the organization (Yoo and al. 2012)". Besides they listed digital platforms as " enable firms to compete using ordinary, readily available resources at lower costs and generally provide higher value to customers (Fréry et al. 2015)". They indicated that digital platform ecosystems are "address systemic constraints such that people affected by those constraints join the platform in order to access resources, infrastructure, or networks (Gawer and Cusumano 2008)". They specified that digital ecodynamics are "a systemic phenomenon involving complex interactions among the triad of environmental turbulence, dynamic capabilities, and digital systems; the tight fusion among the three elements almost to the point of inseparability requires a "holistic" approach (El Sawy and al. 2010)". Bouayad and al.(2020) articulated the term of medical recommender system; They argued that "… some initial efforts in this direction to integrate recommender systems with existing electronic medical records, with the purpose of optimizing health care plans (Duan and al. 2011) and predicting disease risk (Davis and al. 2008)". Stocchi and al. (2021) highlighted digital hubs and they described them as "web analytics and social media analytics". Also, they revealed the term of mobile apps, or apps; they outlined them as "the ultimate marketing vehicle (Watson and al. 2013) and a staple promotional tactic (Rohm and al. 2012) to attract business "on the go"(Fang 2019)".
There are many other terms marked in the included articles in addition to those mentioned above but they are not defined. We concentrated our focus on the two sets' defined terms and how they are related in the included articles. In the following section we highlighted some cases which retained our attention.

Junction Between Terms with Economic and Those with Digital Features

In the included article we found some correlation between some terms based on economic characteristics and others based in their meaning on digital. In this context Garud and Karnøe (2003) explained technology entrepreneurship in Denmark. Technology entrepreneurship in Denmark is based on the correlation between technology and bricolage. The authors demonstrated that actors in Denmark adopted the "bricolage" strategy, which is defined by co-shaping of the new technological route and seeks small but consistent benefits. Basu and al. (2013) studied the net relief kits. It's an example of frugal innovation which is based on a combination of technologies, into a single device. They described net relief kits as a "communication hub in a box" for non-governmental organizations operating in the field. Ahuja and Chan (2019), showed that by following the principles of frugal innovation(Bhatti and al. 2017; Radjou and Prabhu 2014) firms can design business models as well as technical solutions that directly alleviate some of the constraints. Busch and Barkema (2021)studied the case of community organization which starts with bricolage to offer a computer training program using old places (garages), under-used and under-valued equipment, community members who are not teachers but have computer skills. Then community organization kept the same "bricolage" approach in its use of technologies for communication with partners in other countries, preferring low-cost technologies, such as facebook, skype, and internal platforms.

Discussion

The findings showed that in literature there are several terms based on economic and others on digital features. These terms could be combined without a theoretical explanation or conceptual definition. We would like to investigate this junction theoretically, which we call frugal digitalization. The choice of the designation of this phenomenon is based on the distinction between concepts in question mentioned in table 1 and the technologies that allow for the automatization of a large part of the tasks. Table 1 shows that, even though the concepts share the same economic option, they are slightly different and can be classified into two groups. The first category includes frugality, jugaad and bricolage, these concepts related to overcoming constraints. The second category includes moderation and financial responsibility: they

present a preference for an economic choice without focusing on the presence of constraints to be overcome. According to the research's starting points, we focus on the first category in order to select the appropriate concept that reflects the choice of economic option to digitalize and overcome constraints that firms face, particularly in emerging countries. Although jugaad means resourcefulness or ingenious ability to improvise a solution under difficult conditions, using simple means (Radjou and al. 2012). we eliminate this concept linguistically; it is a Hindi word: it is practiced by almost all Indians in their daily lives to make the most of what they have (Radjou and al. 2012). The decision stands between frugality and bricolage. However, bricolage is generally considered a temporary way out, which could reduce business performance over time and on a large scale (Baker and Nelson 2005; Sonenshein 2014)." As a result, under constrained conditions, frugality appears appropriate concept to described the digitalization, which we refer to as frugal digitalization.

Conclusion

Based on the idea that some organizations are operating in difficult situations related to the scarcity of resources, especially in the emerging countries, and which need to digitalize, like companies that have underwent the digital, we propose frugal digitalization to conceptualize the phenomenon. Such initiative conducts us to search for the extent of frugal digitalization in previous research by conducting a systematic literature review which help us to understand frugality, digitalization, their related terms and if there is any junction between them. According to the findings of this systematic literature review, the terms based on economic features and the terms with a meaning related to digital are interesting subjects in information system research, and researchers have focused on this mix without theoretically defining it. We called this mix frugal digitalization. The current findings will help us to conduct in future research the development of a definition of frugal digitalization, which may focus on specific relationships between two concepts that already exist in the literature, namely frugal and digitalization.

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