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Achieving Organizational Agility through Application Programming Interfaces: The Effect of Dynamic Capability and Institutional Forces

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Abstract:

Digital platforms have contributed enormously to the success of businesses. Whereas the Information Systems literature is dominated by digital platform research, less is mentioned about Application Programming Interfaces (APIs), the fiber that connects digital platforms. Critically, the normative literature seems to be silent on how developing economy firms achieve agility through API integration. In addressing these research gaps, this research seeks first to investigate how developing economy firms achieve agility when they integrate APIs. Furthermore, the study aims to understand which forms of institutional forces enable or hinder the API integration process. Philosophically, this study will be approached from a critical realist perspective and will adopt a qualitative method of inquiry.

Keywords: API, Organizational Agility, Digital Platforms, Dynamic Capability, Institutions

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1. Introduction

The business environment these days has become very dynamic. Economic forces such as demand and supply are responsible for such dynamism (Sturm, Pollard, & Craig, 2017). Moreso, are the changes in the kinds of products and services customers demand. As such, organizations need to strategically position themselves to sense changes as they occur in the business environment (Panda & Rath, 2017). The volatility of the various markets in which firms operate also influence firms to become dynamic and remain relevant and competitive. By this, firms should have an attitude of sensing and respond to changes that are related to the markets they belong to (Overby, Bharadwaj, & Sambamurthy, 2006; Panda & Rath, 2017). Consequently, firms become more innovative by transforming their challenges into opportunities (Panda & Rath, 2017). Digital platforms drive such innovations by ensuring that organizations introduce new offerings.

Digital platforms are perceived as the ideal technologies for organizations that seek to innovate. There is no doubt the IS literature is flooded with the research on digital platforms (Tiwana, Konsynsky, & Bush, 2010; Ghazawneh & Henfridsson, 2013; Gawer, 2014) at the expense of APIs – the tissue that connects digital platforms and the digital ecosystems. Most application providers quickly lose sight of the fact that APIs are the essential elements that form digital platforms and ecosystems (Pettey, 2016). A crucial component of the software ecosystems that relate to software architecture are APIs (Manikas, 2016). The importance of interfaces vis-à-vis the way software is developed and managed is evident in past research (Cataldo & Herbsleb, 2010; Robbes & Lungu, 2011; Manikas, 2016). Application Programming Interfaces (APIs) have become ideal for applications, systems, and platforms to connect. The attention APIs are receiving has led to extant research in that area (Qiu et al., 2016; Shatnawi et al., 2016; Santos et al., 2016; Diprose et al., 2016).

APIs, are drivers for most of the innovations that are taking place across businesses today (Pettey, 2016). APIs are becoming enablers for turning businesses into platforms. APIs afford easy integration and connection of people, systems, places, and help create user experiences (Pettey, 2016; Anuff, 2017). Research on APIs, in general, has undergone some considerable growth over the last couple of years though the concept itself is not new in the world of information technology (IT). This notwithstanding, past research on APIs have focused on the technical dimensions such as tools used in API development; thus, neglecting the social concerns (Spinellis & Louridas, 2007; Qiu et al., 2016).

Prior studies on dynamic capability have shown that firms can deploy resources and build capability to adapt to changes in both their internal and external environments. However, for firms to enjoy maximum performance over a more extended period, they need to have some agility (Panda & Rath, 2017; Sturm et al., 2017). This allows firms to sense for changes in the environment and respond to such changes. This study seeks to investigate how firms can achieve

agility through APIs. Nevertheless, integrating IT innovations such as APIs within firms is either hindered or enabled by some institutional forces (Scott, 2014; Effah, 2016). The institutional theory seems to be very appropriate when considering external influences that come from social, technical, political, and even organizational levels on the assimilation of technology innovations.

The purpose of this study is to investigate how developing economy firms achieve agility through API integration. Based on the institutional theory and dynamic capability theory, this study seeks to achieve the following: a) understand the nature of API integration within developing economy context; b) investigate the users' perspective on API enabled services in developing countries; c) explore the firms' perspectives on API user outcomes; d) Examine the forms of agility present after API integration e) investigate the institutional effects occurring during the API integration process.

The rest of this paper is organized as follows: the next section provides a brief literature review on APIs. The section that follows presents the proposed theory that underpins the study. Next, the authors briefly discuss the methodology for the study. Finally, the authors outline the potential contribution of the study.

2. Literature review
This section primarily reviews the literature on APIs. APIs fall within a body of knowledge. Establishing how this research is related to past research is very critical.

2.1 Framing Application Programming Interfaces Research
The past couple of years has seen a dramatic increase in the use of mobile devices to transact business. Consequently, the 21st-century consumer prefers to interface with a company through their mobile devices. Due to the competitive and volatile business environment coupled with the power customers wield, businesses are also becoming more agile by responding to the dynamic nature of customers and the business market (Sturm et al., 2017). This trend has enabled firms to become more innovative by transforming their challenges into opportunities. APIs are undoubtedly becoming the building blocks for mobiles and for fulfilling most of the innovations that are taking place across businesses (Pettey, 2016).

A thorough review of existing literature on APIs has shown a rather one-way trend; thus, existing studies tend to focus on more technical issues such as the development (Zibran, Eishita & Roy 2011; Qiu et al., 2016; Shatnawi et al., 2016; Santos et al., 2016; Diprose et al., 2016). For instance, the scope or research covers issues such as tools used in developing APIs (Qiu et al., 2016). Consequently, existing research seems to overlook the other equally important social issues (Ofoeda, Boateng, & Effah, 2019). Recent works by some scholars on value creation, for instance, resonates calls for more in-depth action on the social aspects of APIs (Wulf & Blohm, 2020; Ofoeda, 2020). Whereas it is established that APIs drive innovation (Abigee, 2016), the current trend of API research seems worrying. This is because it has failed to offer a wholistic insight into both the technology (API) and the people that make sense of the technology (consumers). There is a darth in current research on the two sub-systems; thus, the technology and the people (Avgerou, 2008; Orlikowski & Baroudi, 1991). Exploring these sub-systems will

enable us to have an in-depth understanding of how APIs advance the course of firms. Besides, the current discourse on API innovation has failed to provide the outcomes of API-enabled services such as agility (Benzell *et al.* 2016). These knowledge gaps have, therefore, necessitated the current study, notably from a developing country context.

3. Theoretical Basis

The theoretical framework is for this study is based on two major theories in the IS field; thus, the Dynamic Capability (DC) theory and the new institutional theory. These two theories have been used extensively in mainstream IS literature to investigate various kinds of IS phenomena (Agarwal & Selen, 2009; Baptista, 2009). What is, however, missing in the literature is the use of these two theories to investigate a particular IS phenomenon like APIs. Yoo, Henfridsson, and Lyytinen, (2010) have called for a generalizable theory provides an explanation to API design and integration research amid their consequences (Wulf & Blohm, 2020). This study arguably addresses this gap by combining these two theories.

The DC theory focuses on a company's ability to integrate, build, and reconfigure internal competencies to address, or bring about, changes in the business environment (Teece et al., 1997; Teece, 2007). Previous studies on DC have shown that firms can deploy resources and build capability to adapt to changes in both their internal and external environments. By its application, the author seeks to identify the various forms capabilities available in the case organizations and to understand how these capabilities contribute or influence the API development and integration process. Moreso, for firms to enjoy maximum performance over a more extended period, they need to be agile. Agility allows firms to sense for changes in the environment and respond to such changes. Furthermore, a grey area relative to DC research is further investigation into the process of sensing (for changes), learning, integrating, and coordinating various capabilities in firms (Miles, 2012). The current study seeks to explain how firms achieve agility through APIs.

Apart from the DC theory, the new institutional theory also underpins the current research. The normative literature has shown that integrating IT innovations such as APIs within firms is either hindered or enabled by some institutional forces (Scott, 2011; Effah, 2016). The institutional theory posits that institutions comprise "cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life (Orlikowski & Barley, 2001; Butler, 2003, Scott, 2008).

From these two theories that researcher argues that though resources are crucial for the survival of firms, it does not guarantee success. Adopting and using innovation within a firm is primarily driven by a firm's environment and pressures and not just forces such as the IT used (Teo et al. 2003; Doolin & Troshani, 2007; Awa et al., 2015; Awa et al., 2015b). The institutional theory seems to be very appropriate when considering external influences that come from social, technical, political, and even organizational levels on the assimilation of technology innovations.

4

| Regulative Institutions | Normative Institutions | Cognitive Institutions |

Process of building capabilities → Realizing Capabilities →

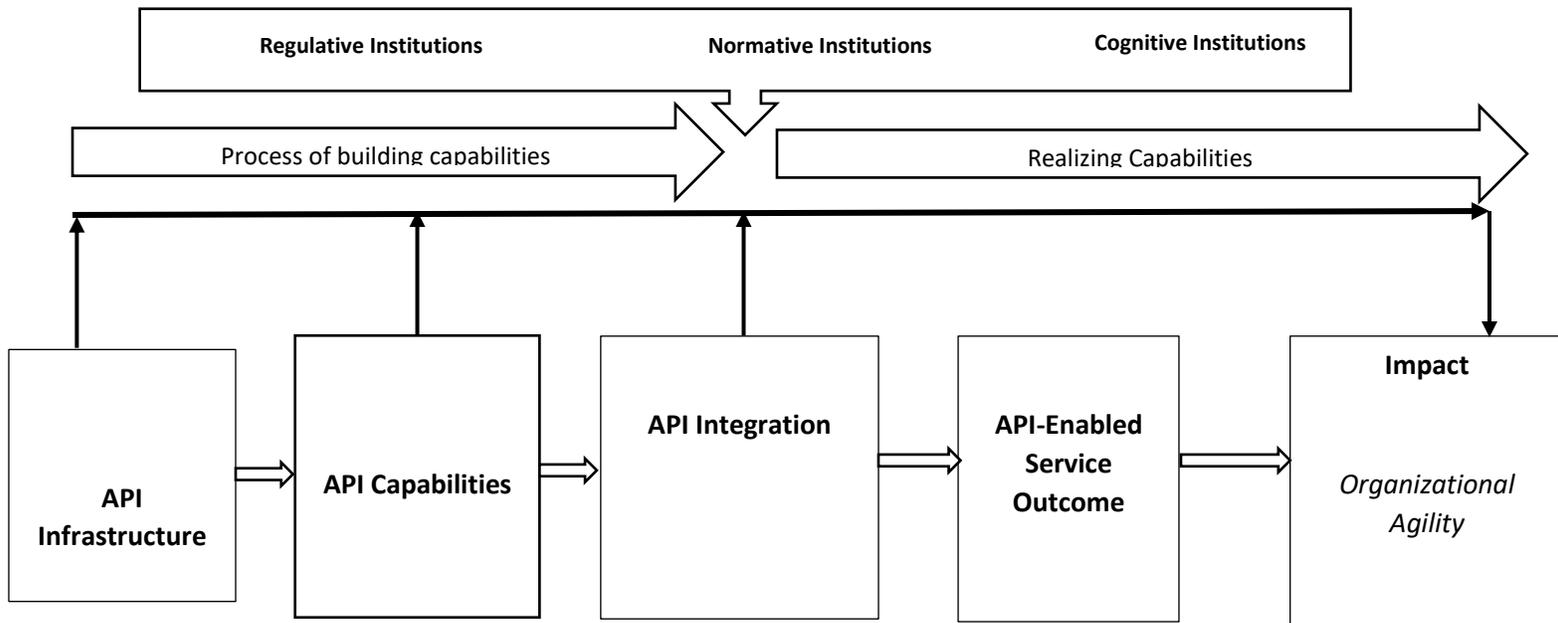| API Infrastructure | API Capabilities | API Integration | API-Enabled Service Outcome | Impact
Organizational Agility |

Figure 1: Conceptual Framework
(Source: Author's Construct)

Figure 1 presents the conceptual framework of the study based on the review of the DC framework and the new institutional theory. The argument raised in this research is that for firms to integrate APIs, they need to possess some capabilities such as API capabilities, IT and human resource. When firms integrate APIs as part of their innovative strategies, it could make them agile in the long run. Studies have shown that capabilities such as IT capabilities (Bi et al., 2012) and human capabilities (Teece, 2007) contribute to the agility of organizations. However, various institutions, such as regulative, normative, and cognitive institutions, shape multiple kinds of innovation, such as APIs. The new institutional theory has been used in extant research to investigate the social contexts that shape IS innovation (Scott, 2011; Wiredu, 2012; Kent et al., 2014; Effah, 2016). The regulative, normative, and cognitive forces of the new institutional theory help us to understand better both the internal and external effects of social and technical issues that will arise from the use of every IS. Consequently, this study seeks to explore which forms of institutional forces shape the API integration process. Furthermore, the study aims to investigate which types of agility are experienced by developing economy firms when they integrate API innovations.

4. Research setting and methodology
The current study is ongoing research at the University of Ghana Business that will lead to the award of a PhD in Information Systems. The study seeks to investigate how developing economy firms achieve agility through API integration. This study will be undertaken from a critical realist philosophical perspective and will be based on a qualitative case study research (Mingers, 2004). Qualitative research allows the researcher to investigate the meaning of how people live

under certain real-world conditions. The choice of qualitative research is also to ensure that the views and perspectives of the study participants are brought to bear (Yin, 2011). Case studies are one of the predominant qualitative methodologies because of they have been legitimized and have a structured protocol (Yin, 2002; Yazan, 2015). Yin (2002) further argues that case studies are ideal when the research seeks to address the "why" or "how" types of research questions. Qualitative data collection instruments will include the use of interviews, observations, and official documentation.

4.1 Research Setting
The setting for this research is Ghana, which is a developing economy in Sub-Saharan Africa. Ghanaian firms are leveraging APIs in their business operations. The level at which firms open up their applications to other firms is also increasing steadily. Besides, there is also an increase in the number of firms that develop APIs for both internal and external consumption. This trend is promoting the growth of the digital ecosystem in Ghana. Also, the use of mobile technology to transact business is also rising among Ghanaians. This and any other cases make Ghana an appropriate setting for a study like this.

4.2 Data collection
Data will be conducted between November 2019 to April 2020. This will ensure that data is collected from multiple sources to enrich the analysis and findings. Twenty-one firms were sampled, but currently, data will be collected from 10 participating firms. This is because some of the firms chose to drop out of the research. Qualitative data will be collected through means such as phone calls, formal interviews, observations, and business documents. Preliminary data will be collected to help reshape some of the questions (Wiredu, 2012). Concerning the interviews, formal, semi-structured interviews will be conducted with five participating firms (15 participants). The interview questions will be focused on how the firms develop and integrate APIs. Other questions solicit views on how APIs have shaped the business processes of the selected firms, and the institutional forces that make the integration of APIs possible or the vice-versa.

4.3 Mode of analysis
Primarily, we do data analysis to reduce the quantity of the data but also lose the meaning of the data. The analysis of qualitative data will be based on the techniques of Miles and Huberman. Miles and Huberman (1994) provide a thematic analysis framework based upon which researches can analyze their data. The analysis framework has themes such as data reading, summarization, reflection, and categorization (Miles, Huberman, & Saldana, 2013). Based on the theoretical framework proposed, the authors will identify and categorize data that are related to DC, and elements of the institutional theory such as regulative, normative, and cognitive issues.

5. Potential contribution
The potential contribution of this study is as follows: for research and theory, the study seeks to provide a framework for the integration of APIs and provide a multi-level analysis of perceptions of developers and consumers. The findings will also strengthen the literature within the IS discipline since findings will emanate from a generalized theory. For practice, the study will illustrate the critical forces needed to address the development and integration of APIs. For policy, the study will explore the policies that determine how enterprises connect their data,

software with others. Concerning originality, this study will prove to be the first to provide a multi-level analysis of API services (developer and consumer perception) and conceptualization of the API economy in Ghana. It will be the first research to explore how organizations in developing economies achieve agility amid their institutional frames; thus, moving beyond the predominant technical analysis on APIs into some social dimensions such as value creation.

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