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Abstract
Application Programming Interfaces (APIs) are perceived as major enablers of digital transformation, as such they have attracted the attention of both practitioners and researchers. This notwithstanding, past research on APIs have focused largely on the technical dimensions, neglecting the social and cultural contexts. The purpose of this study is therefore to understand how regulative, normative and cognitive institutions affect the development and integration of APIs in Ghana. Drawing on the new institutional theory as a lens and an interpretive case study methodology, our findings show that normative institutions such as business strategy, customers need, relationships, and experience of vendors enabled the development and integration of APIs. However, regulative institutions in the form of regulations and laws (unwillingness of some institutions to integrate with other applications), security concerns, were regarded as constraining factors to API integration. Also, Cognitive forces in the form of non-disclosure issues and carelessness constrained the integration of APIs.

Keywords
API, development, integration, institutional forces, developing country

Introduction
Application Programming Interfaces (APIs) are arguably the source of much of the innovation that is taking place across firms vis-à-vis how they manage their information technology and do business. APIs are perceived to be enablers for turning businesses into platforms (Pettey, 2016). This is because they allow easy integration and connection of people, systems, places, and help create user experiences (Pettey, 2016). APIs help firms to open-up their operations to themselves and associates and subsequently helps drive digital transformation. Uber for instance through its digitization agenda has been able to leverage google maps through an API to assist drivers and passengers.

Generally, existing literature on APIs (Qiu, Li, & Leung, 2016; Shatnawi, Seriai, Sahraoui, & Alshara, 2016; Santos, Prendi, Sousa, & Ribeiro, 2016; Diprose, MacDonald, Hosking, & Plimmer, 2016) have focused on the technical dimensions, which largely involves the development of APIs. This stream of research covers areas such as programing and security of APIs. As a result, API research is mostly found in computer science journals such as journal of systems and software. Arguably, there is little or no evidence of API research within the Information Systems (IS) discipline. This probably indicates that there is a lack of user/managerial understanding of APIs in most organizations and how they support the growth of the digital economy (Anuff, 2017).

Relative to the development and integration of APIs across firms, IS research has also shown that there is little research on institutional safeguards, structures, assurances, and values within the IS discipline (Sambamurthy & Jarvenpaa, 2002). This call for more studies on contextual effects on IS innovations has also been supported recently by Hsu et al. (2012) and Effah (2016). In line with this, there is a seeming research deficit on the socio-technical dimensions of APIs; notably how socio-cultural forces shape the
API development and integration process (Shatnawi et al., 2016). Unfortunately, little is known about the institutional forces that affect the development and integration of APIs.

In line with these knowledge gaps, this study seeks to first, investigate the nature of APIs among Ghanaian firms and second, explain which institutional forces in the form of normative, regulative and cognitive forces affect the development and integration of APIs in Ghana. The implication of this study is to offer great insight into possible institutional effects on API development and integration in Ghana. The research questions motivating the study therefore concerns, what the nature of API development in Ghana is and which institutional forces affect API development and integration among Ghanaian firms.

The rest of this paper is organized as follows: the next section reviews literature on APIs. The subsequent section discusses the theoretical framework of the study. The section that follows entails the methodology. The next section presents the findings of the study. The final section focuses the analysis and discussion of the findings. The study then concludes by presenting the contributions, implications and recommendations for future research.

**Literature review**

**Application Programming Interfaces and the Digital Economy**

The competitive and volatile business environment, coupled with the power customers wield, is compelling businesses to become more agile by responding to the dynamic needs of customers and the business market (Sturm, Pollard, & Craig, 2017). This trend is causing firms to become more innovative by transforming their challenges into opportunities (Sung, 2009; Vangie, 2014). Pursuant to this, APIs are becoming the building blocks for fulfilling most of the innovations that is taking place across businesses.

Most of the end results of innovations are the use of software (Ágüila, et al. 2003). Software has become indispensable in transacting business today. Nonetheless, it is a daunting task developing a software from scratch. These days however, developing such complex applications is based on reusing existing functionalities rather than developing it from scratch (Zibran, Eishita, & Roy, 2011). APIs provide functionalities that are pre-implemented and tested (Frakes & Kang, 2005; Shatnawi, et al. 2016), and helps in software reuse. This approach has reduced the efforts programmers spent in coding, testing and maintaining software thereby increasing the quality of the software (Zibran, et al, 2011; Shatnawi, et al. 2016). From a technical dimension, we define APIs as a set of protocols for building software applications (Zibran, et al, 2011). Notably, APIs provide a set of technical specifications to efficiently interact with and ultimately integrate applications and business systems. Broadening the scope of the definition, we argue that APIs constitute the very fabric of connecting ecosystems of organizations and individuals (Berman & Marshall, 2014). This is because APIs can specify how one software component or system can communicate with a provider of some services (Spinellis & Louridas, 2007). Studies have shown that APIs form one of the biggest drivers of the digital economy. This is because APIs open-up businesses and connect them to customers, suppliers and partners (Petty, 2016). The Google Maps API for instance, allows developers to display maps for specific regions, calculate distances between two locations amongst other things (Espinha, Zaidman, & Gross, 2015).

This notwithstanding, empirical literature on APIs has emphasized more on the technical dimensions, thus, neglecting the social components. For instance, the scope or research covers issues such as tools used in developing APIs (Qiu, et al. 2016, Shatnawi, et al, 2016). This does not seem surprising because hitherto, the concept of APIs was predominantly in the domain of developers (technical people). Nonetheless, it has become an issue of great concern for managers and business leaders (Deloitte, 2016).

We reason here that the paradigm shift of API related issues from the technical domain to managerial levels (Deloitte, 2016) calls for IS research (thus a mix of the technical and social issues vis-à-vis APIs). This is because for every business or organization to survive there needs to be an approach that recognizes the interactions that exists between people and the technologies of the workplace (Avgerou, 2008). Thus, a fit between the technical sub-system and the social subsystem. These two subsystems come together to make up the organization, thus technology and people. This is important because it is the people that make sense of the potential technologies in the workplace (Avgerou, 2008). Luna-Reyes et al. (2005) also opined that the social and organizational structures can be changed by IT. In this regard, the social approach of IS does not entirely neglect the technology; rather they focus on how the technology can transform people and
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businesses. This approach reiterates the ‘ensamble views’ of Orlikowski and Lacono (2001). This approach argues that the hardware and software are components of a more complex socio-technical collaboration which also takes into consideration the people, the work processes and the institutional and cultural forces that make things possible in organizations (Cited in Luna-Reyes, et al., 2005).

In addition to this, a world economy report suggests that what truly differentiates and gives a digital enterprise a competitive edge is its culture and the way in which they operate (Forum, 2016). For most developing economies, there is an over reliance on imported technologies. In doing so many developing countries lose sight of the fact that there are different cultures and institutions all around the world and these cultures are influenced by people. In view of this, Averou (2001) and Heeks (2002) warn against the direct transfer of technological experiences from developed to developing countries due to contextual differences and social habits (Boateng, et al, 2016; Ofoeda & Boateng, 2016). In the case of this study, we believe that the cultural and social environment in developing country organizations play a very crucial role in the deployment and use of any Information System. What the current study therefore seeks to do is to understand how institutional forces affect the development and integration of APIs among firms.

**Theoretical Basis**

This study is approached from an interpretive case study perspective and uses the new institutional theory as analytical lens (Scott, 2008; Effah, 2016). The new institutional theory gives us a better understanding of how institutional forces (regulative, normative and cognitive) influence the development and integration of APIs in a developing country (Ghana). The researchers consider the new institutional theory useful because it gives better explanation to how various social structures (regulations, norms and cognitive processes) shape social actions and interactions (Scott, 2008; Scott, 2011; Scott, 2014; Effah, 2016; Biesenthal et al. 2017) vis-à-vis how APIs are developed and integrated in Ghana.

According to Bjorck (2004), social behaviors affect the use of IS. In view of this it has become crucial to study the social dimensions in IS phenomenon such as adoption, use, maintenance etc. In response to this, Scott (2001, 2004) attempted integrating different institutional dimensions into a single and logical framework (Bjorck, 2004). Based on the institutional theory, Scott (2001) perceives organizations to be more of social and cultural systems rather than production systems. Scott (2001; 2004) further opined that institutions comprise “cultural-cognitive, normative and regulatory elements that, together with associated activities and resources, provide stability and meaning to social life”. Institutions are, therefore, recognized socio-cultural and legal practices that shape and guide individual and organizational behavior in each social context (Averou, 2000; Effah, 2016). Based on these arguments, Scott (2001, 2008) presented three major elements of the institutional theory. These include normative, regulative, and cognitive coupled with their respective elements (cited in Effah, 2016).

Regulative institutions are those institutions that determine actions in a social context being it legal or illegal (Scott, 2001). These regulations are in the form of laws, legislative instruments and company policies that guides how APIs are developed and integrated across industries. Second is the normative institution. These institutions focus on the norms and values that determine legitimate and illegitimate actions in social contexts (Effah, 2016). Normative institutions capture those values that are deemed acceptable or unacceptable in an organization. Normative institutions also go beyond the ethical values of the organization and offer rules for organizations to determine legitimate actions (Effah, 2016). For the purposes of this study, the authors argue that normative institutions denote the various recognized customs and traditions that are typical of the socio-technical and economic setting of how APIs are developed and integrated. The third and final element of the new institutional theory is referred to as cognitive institutions. They generally are referred to us the “taken-for-granted” customs and traditions that control the sense making and decisions-making processes of social context” (Effah, 2016). In this study, cognitive institution is those thinking, behavior and patterns of decision making of organizations that develop and integrate APIs. The difference between the three elements of the theory, thus, normative, regulative and cognitive institutions are primarily for investigative purposes. This notwithstanding they could overlap in practice (Scott, 2001, 2008, Effah, 2016).

The new institutional theory was chosen because its elements provide valuable concepts to help appreciate the regulative and socio-cognitive forces that hinder or enable the development and integration of APIs. Its usefulness is also seen in its relationship between IS innovations and their organizations and societal
contexts (Averou, 2000). Institutionalism also offers IS researchers an advantage of conceptualizing the digital economy that is fashioned by cultural forces (Orlikowski & Barley, 2001). Though the new institutional theory has been used to study various IS innovation and their social context, their use in understanding specific digital innovations such as APIs, is arguably non-existent.

Research Methods
This study forms part of a larger research project into how firms achieve agility through APIs in developing countries. The methodology adopted in this study is a qualitative, interpretive case study (Walsham, 2006). Paré (2004) avers that case studies are useful when we seek to provide holistic, in-depth investigation into an IS phenomenon. Also due to the neutrality of IT, it is virtually impossible to separate it from the context in which it has been applied (Orlikowski, 1992; Paré, 2004). As such the authors sort to understand the institutional forces that come to play with respect to how businesses integrate APIs. The current study is approached from two distinct philosophical assumptions. First, the study is approached with interpretive epistemology (Walsham, 2006; Effah, 2016) and second, critical realist ontology (Mingers, 2004). The approach used in data gathering was highly influenced by interpretivism whereas critical realism informed the perception of APIs as material, and hence real and objective (Wiredu, 2012). Ontology asks the question whether our social and physical worlds are objective and exist independently of humans, or subjective and exist only through human action (Orlikowski & Baroudi, 1991). Critical realism enables the IS researcher to “get beneath the surface to understand and explain why things are as they are, to hypothesize the structures and mechanisms that shape observable events” (Mingers, 2004). From an interpretive perspective, we believe that knowledge gathered is subjective. This is because what we accept as knowledge depends on the views of people. This results in the subjectivity of what we accept as knowledge. This emanates from the assumption that there are multiple ways of establishing knowledge. Human beings have different belief systems and interpretations (Wiredu, 2012). The purpose of this paper therefore is to understand the institutional forces that enable or constrain the development and integration of APIs in organizations from various human perspectives.

Research Setting
The setting for this research is the developing-country context of Ghana. Fifteen (15) possible case organizations were sampled for the purposes of this study. This was to improve the external validity of case studies. It was also important to ensure a coherent selection process of our cases rather than just focusing on their statistical selection (De Vaus, 2001; Boateng, 2014). The aforementioned technique ensures that the researcher is familiar with some characteristics of the case before selecting and conducting the actual study (Boateng, 2014). Validity is also to ensure that there is a proper triangulation of data from multiple sources such as interviews and documents (Gibbert & Ruigrok, 2010). Preliminary data was collected between October and December 2016. In the pilot study, data was collected from 5 firms. 3 firms were subsequently selected as possible case firms at the end of the pilot study. After analyzing the data from these three firms after the first stage of data collection, the number was reduced to just two firms. During the second phase of data collection however, our contact in one of the firms had to end the interview few minutes after it started because he had an equally important assignment to undertake. Thereafter he was not able to make himself available for subsequent meetings. In view of this we settled on just one firm for this study; TelMob (pseudonym). The choice of TelMob was greatly influenced by the theoretical underpinning of the current study, history of the firm with respect to developing and integrating APIs. TelMob also had the necessary experience needed for a detailed analysis. The company has great experience in providing tailor made services for mobile network operators, third party clients, platform owners etc. for the critical realist the premise for generalizing is seen in the ability of the fundamental causal mechanisms to clarify a particular occurrence of the phenomenon being studied. As such, using a single case study provides an assurance in events where predictions are replicated (De Vaus, 2001; Boateng, 2014).

Data collection
Data was gathered between January – March 2017. As Walsham (2006) puts it, the interpretive researcher depends on data from multiple sources. In view of this the researchers collected data from 15 participants in the selected organization. Data was collected through means such as phone calls, formal interviews, observations, and business documents. First, we made phone calls with our contacts in the case organizations. The information we obtained from these phone calls helped us to reshape our research problem and gave us the opportunity to design our interview guide (Wiredu, 2012). With respect to the
interviews, the researchers conducted formal, semi-structured interviews with 15 participants in the
selected case organization. The interview questions were focused much on how APIs have shaped their
business processes and the institutional forces that make the integration of APIs possible or the vice-versa.

Additional data was also gathered from participants through informal discussions. These discussions relate
to how APIs are integrated and how they have helped businesses achieve their objectives. After the initial
data was collected, the researchers presented the preliminary data to the participants. This process offered
the researchers the opportunity to receive various feedbacks from the participants. This period also allowed
for mistakes to be corrected in the data before any form of analysis was done.

Mode of analysis
The data analysis follows a qualitative, thematic analysis by Miles & Huberman (1994). This approach
mainly focuses on carefully reading, summarizing, reflecting and categorizing data into thematic themes
(Miles & Huberman, 1994; Walsham, 2006; Effah, 2016). Using the new institutional theory as our
theoretical lens, the researchers identified the various themes in the data that were related to regulative,
normative and cognitive institutions and how they hindered or enabled API integration. More precisely,
using this approach follows the various flows of analyzing data. First is to do what is called data reduction;
thus, the process of breaking down data into write-ups. Second is data display. Third is the verification and
drawing conclusions. Furthermore, in using this approach, Miles and Huberman (1984), postulated that
conclusions need to be verified and the meaning from the data must be confirmed. Verifications and the
provision of feedbacks is to ensure the authenticity, plausibility and criticality of the analysis (Walsham,

Findings
Nature of APIs: Their development and integration
APIs can best be explained in a scenario like this: In the house, I leave in, I know where my gate and doors
are located. Besides, nobody should tell me where to pass to get to my dining hall, where my TV is located
etc. If you are a visitor coming to my house for the first time however, I will have to give you a map or
guide. I will first have to tell you where my house is located and how you can get into the house; either by
knocking or ringing a bell. Upon entry, also, I will have to show you where to get what you want. The
reason is because I wouldn't want you to get confused, running around the house looking for something
you could have easily found if I had showed you where it was. That is basically how APIs work. They are
rules and regulations that is given to a third party (anybody who wants to enter and use your application).
They are built to make anyone coming into your environment (application) have it easy to access whatever
information he wants. Besides APIs also offer second or third parties guides to use an application. They also
open-up businesses and helps two systems “talk” to each other without any form of difficulty.

Our case organization builds and integrates APIs, thus, internal and external integration. Internally,
TelMob builds and integrates APIs into its own applications; which aids their applications to communicate
with each other. Externally, there are external applications that clients would like to integrate with TelMob.
For instance, clients who want to run promotions by connecting to TelMob simply have to connect with an
API. Before any connection is established however, it is important to find out from the client which form of
connection they want (thus FTP, SMP or HTTP connection). Each of these connections have already built
APIs. In that case which ever API that works for a client is that which is sent to the client for scrutiny and
subsequent integration.

There are several benefits that firms derive when they use APIs. The ultimate however is to make life earlier
for anybody who wants to interface with another application. APIs gives you a step by step approach to what
you want from an application and how you can get that which you want. Also, there are no restrictions with
respect to the language of APIs. Developers can build APIs in html, java, php, python, and several other
languages. Critically, there are structures developers can follow in developing standard APIs. In effect, it
makes it easier for systems managers to properly manage their systems. One of the programmers in our
case organization had this to say:
“For me as a technical person I want an API that is straight to the point. I want an API which will tell
me this is what I will get when I query this or that... no long processes.”
Whereas opportunities abound for businesses who use APIs, there some couple of challenges developers face when developing and integrating APIs. Some clients for instance build their own platforms and they want to integrate to another totally different platform. In such situations, it becomes difficult to integrate such diverse applications. In a situation like that however, developers will have to study the two applications carefully and build a separate API from scratch which is quite a daunting task to undertake.

“Assuming you have a banking software and I have a petrol shell software and you want me to integrate with yours, it’s going to be difficult. The standard of the banking institution is different from that of the petrol shell stations so it is practically impossible to integrate.”

Furthermore, it came to light that APIs have moved from the domain of technical developers such as programmers to becoming business model drivers. This is because firms are taking steps to analyze which API best suits them. As such managers of firms are having keen interest in APIs lately. Participants in our case organization have underscored the importance managers place on APIs. One of our participants had this to say: “Issues of APIs are gradually taking center stage at the top management levels. It has become part of strategic decision-making process of our organization because APIs are integral to what we do.”

**Strategies for API development and integration**

Findings from our study shows that the development or integration of APIs is driven by a need. Conceivably, when an external firm needs an API, they make their intentions known and provision is made for them. Besides, APIs are also developed and integrated internally to streamline the internal business activities. According to the IT manager,

“APIs are not churned out on their own. Whoever needs the APIs first makes a request and then the company provides according to that need.”

Largely, the needs of firms emanate from their strategy. The short and long-term action plans of most firms lead them into deploying APIs. For a company like TelMob, developing and integrating APIs has enhanced efficiency. Prior to this new strategy of using APIs, there was the traditional culture where two different companies will have several sit-down meetings discussing what they want and how things should be done. There is a great deal of time spent in these face-to-face meetings. Besides resources are spent on travels, food and accommodation. With respect to the APIs however, they reduce the errors of starting an application from scratch. One content developer had this to say:

“Sometimes rebuilding everything from scratch is very daunting. But now just have your application and you can just connect over an API and whatever you need the API will sort it out. It makes life just easy.”

For firms not to spend time developing a totally new application, one of the strategies is to establish the functionalities of the applications that need to be integrated. For an easy integration to take place, the applications should be similar to a large extent. It will be difficult to use an API for applications that are very different from each other. In line with this, verifying the functionalities of the applications becomes crucial before any form of integration takes place.

**Analysis and Discussion**

Pursuant to the limitations in prior research on the socio-technical dimension of IS research, this paper explains how institutional forces enable or hinder the development and integration of APIs in Ghana. Findings from the case study raises issues that we subject to analysis and discussion. The analysis and discussion in the section is limited to our research question and the underpinning theory.

**Enabling institutional factors**

The authors identify some institutional forces that enable the development and integration of APIs. The findings show that the focus of the organization which was earlier on SMS service moved to mobile service content. Some normative institutions accounted for this new direction of the firm. First, the development
and integration of APIs resulted from the firm’s strategy and customer needs. As Shain (2017) puts it, APIs have become essential not only to the technological strategy but also to the firm’s business strategy. Organizational assets which were in the form of human resources (employees with the technical know-how) accounted a lot for the status quo. These findings seem be consistent with previous research from several scholars such as Salwani et al. (2009); Awa et al. (2017) and Low et al. (2011). Besides that, the external connections of the workers and partners of the organization gives them an urge vis-à-vis developing and integrating APIs. Awa et al. (2017) underscores the importance of business partners in integrating various forms of IS. The General Manager for VAS had this to say about the importance of human resource:

“We thrive more on the human resources we have (those with the technical know-how), our connections with the customers, those who will market the products as well as our partners. These have greatly affected our focus from purely SMS to the current services we provide.”

An alternative normative institution we found that stimulated the initiative for integrating APIs is how application users want to interface with other applications with ease. The advances in technology coupled with the limitations of single applications has enabled firms to interface with APIs. Application users generally prefer to use more than one application linked together at a time. Hence similar applications that want to share information should connect and communicate to each other. At the heart of this is continuous demand of customers to transact business in an easy and efficient manner. Against this backdrop, past research places a great importance on customer demand since it helps understanding needs, demand and quality of products (Swink et al., 2007; Maiga, Nilsson, & Ax, 2015).

Furthermore, APIs essentially reduce the efforts of developing large and complex systems by reusing existing functionalities. This finding is consistent with previous studies that suggest that APIs reduce the efforts spent on coding, testing and maintaining software thereby improving the quality of software (Zibran et al., 2011; Shatnawi et al., 2016). In lieu with this, giving the normative demand for APIs as a way that will allow individual systems to ‘talk’ to each other, TelMob exploited this need to deploy APIs to clients that need it.

Another institution that greatly encouraged the development and integration of APIs is how the developers immerse themselves in the development and integration process. This phenomenon reiterates the need to view IS as socio-technical and not purely technical (Averou, 2008). Developers are able to manage the various platforms because they have not isolated themselves from the process. This position is resonated by a programmer:

“We know how to manage our platforms and products. Over here, we know the product so much so that that we become part of the product (application).”

The relationship, love and lived experiences of employees play another crucial role in the way APIs are developed and integrated. Besides, our findings suggest that the relationship clients have with employees informs clients on whether to transact any form of business with the organization. The individual acquaintances of employees go a long way to determine which kind of service clients will want. One respondent gave an interesting insight into this...

“We have become relevant because our clients form relationship with individuals in the company before they look at the company as a whole for services.”

It is worth noting from our findings that the various needs of clients, the human resources, connections, relationships with clients and the love for the job enabled the development and integration of APIs at TelMob. Besides these enabling forces, there are other constraining forces relative to the development and integration of APIs within a developing country context. As we will see in the next section, regulative frameworks such as laws and regulations, issues of non-disclosure and security constrains the development and integration of APIs.

Managerial support and concern has also been established as one of the enablers for API development and integration in Ghana. As noted in our findings, APIs are have become a major concern for managers today. This finding is not far from past reports from Tech Trends (2015); and Deloitte (2016). This is because APIs provides a platform for businesses within an ecosystem to share their resources in the forms of assets thereby transforming the way firms conduct business with others.
**Constraining institutional factors**

The experiences of TelMob presents some interesting insights with respect to some unclear regulative norms and some cognitive norms that constrain the development and integration of APIs. For instance, there are some institutions who will not allow you to integrate with their platform. These institutions do not allow their data to sit outside their organization; thereby raising interoperability issues. Some institutions also find it difficult to integrate with other systems because of the ‘legacy’ systems they use. In Ghana, institutions such as SSNIT, and Electoral Commission just to mention a few will not allow their data to move outside their organization. Developing any form of application for any of these institutions will demand that you do it in their premises. In such instances, you are limited to use their internal resources such as servers, internet resource etc. This according to our respondents slows the pace of work.  

“If we work in our environment sometimes we can even do overnight to deliver the product. Some of these institutions that do not allow their data to sit outside their organization do not have proper resources in terms of internet, servers and so on. But you will be forced to use them because their regulations do not allow them to send their data outside.”

These regulations have consequences, especially inability to meet deadlines. In most cases, the developers are not allowed to plug in any form of external devices; besides they are under strict supervision. These institutional bottlenecks which constrain the development and integration of APIs are perceived to have national security, ethical and confidentiality implications. For instance, Social Security and National Insurance Trust (SSNIT) stores volumes of data such as pensions data of clients. It is therefore important to safeguard such data so as it does not fall in the hands of the wrong people.

The SSNIT pensions ACT stipulates guidelines for their operations. Though some of these laws and regulations don’t state explicitly that data must not leave their premises, some of them are treated as given because of the underlying political, ethical and social implications of data exposure. This finding we see is consistent to previous studies. Clark (2015) advices that firms open up their applications only to trusted applications and users, ensuring that they prudently tackle issues of data misuse on backend systems. Firms therefore are likely to face resistance when opening-up and sharing assets with other external applications (Tech Trends, 2015).

It is also worthy to note that cognitive institution of developers such as not adhering to the issues of non-disclosure hinder the development and integration of APIs. Organizational customs and norms that are taken for granted has adverse effects on the development and integration of APIs. For instance, the security of APIs during the development phase is very crucial. For instance, passwords are periodically changed to ensure integrity of APIs and conform to best practices. There are instances however when some employees forget to change their passwords which affects the entire process.

Furthermore, it is the habit of some employees to disclose sensitive work-related issues to friends and family though they never intended any form of malice. These employees have friends in other competing firms hence some sensitive information is disclosed unintentionally. These disclosures have unintended consequences for both the company and the clients. These institutional apathies as the Connectivity Benchmark Report (2016) puts it could stale an entire API strategy.

**Conclusion**

This study investigated the institutional effects on API development and integration within a developing country context. The study has shown that normative institutions such as business strategy, business/customers need, socio-technical concerns, relationships, and experience of vendors enabled the development and integration of APIs. We also found out that regulative institutions in the form of regulations and laws (unwillingness of some institutions to integrate with their platform), security concerns, were regarded as constraining factors to API integration. Also, Cognitive forces in the form of non-disclosure issues and carelessness constrained the integration of APIs.

The originality of this study stems from the fact that it moves beyond the purely technical literature on API development to examine the institutional forces that enable or hinder their development and integration using evidence from a developing country (Ghana). Previous studies as noted have only focused on how to
develop APIs using various programing languages. This study however takes on a socio-technical approach to how APIs are developed and integrated. This paper has been able to prove that the new institutional theory is appropriate when investigating the effects of API development and integration.

This study has several implications for policy, research and practice. For research, the current study presents one of the groundbreaking studies on how to comprehend the nature of APIs and the institutional factors that affect their development and integration. The study has shown that the digital transformation as powered by APIs is making great thrive in developing countries as well. For practice, the findings show that firms who would like to adopt and use APIs need to take into consideration institutional factors and their possible influences and not only focus on the technology. For policy, the study gives provides insights to policy makers on the kinds of regulations that can enable the growth of the API and digital economy.

Like any other study, this has some limitations. First, we used a single case study in a developing country which may seem problematic with respect to generalization of our findings. Though there could be other factors, the use of the new institutional theory has prevented the authors from exploring other factors which could reveal interesting results. Furthermore, since this is the first of such study, researchers could test for the applicability of the various institutional forces in other contexts for generalizability purposes.

References


