Study and Workshop to Understand the Role of Digital Connectivity in the Formalization Process of Informal Businesses

APEC Small and Medium Enterprises Working Group

January 2025

Asia-Pacific
Economic Cooperation

Asia-Pacific
Economic Cooperation

Study and Workshop to Understand the Role of Digital Connectivity in the Formalization Process of Informal Businesses

APEC Small and Medium Enterprises Working Group

January 2025

APEC Project: SME 202 2023A

Produced by
Universidad del Pacifico (Peru)
Research team: Dr. Cathy Rubiños; Dr. Alejando Flores; Dr. Jorge Heredia

Contractor contact:
Universidad del Pacifico
Email: jc.felicianon@up.edu.pe

Reviewed by:
Ministry of Foreign Affairs of Peru (MoFA)
Project Overseer contact:
Jorge Garcia
Email: jgarciam@rree.gob.pe

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

APEC#225-SM-01.1

EXECUTIVE SUMMARY[1][2]

The formalization of businesses operating informally has garnered considerable attention in academic, political, and governmental spheres. Economic informality, with its significant impact on production, poses complex and multidisciplinary challenges. On the other hand, the evolution of business activities in a 5G environment, increased access to the internet, proliferation of artificial intelligence, and greater digital inclusion in social, financial, and governmental domains have transformed the way business is conducted globally, in both developed and developing economies.

Despite this evident business development and growth, there is no objective evidence on how companies transition from informal to formal status, and on what role digital transformation plays in various economies.

This study addresses the following question: What is the mechanism by which digital transformation can affect and promote business formalization? It also aims to provide a framework for the formulation of public policy guidelines aimed at promoting business formalization in Asia-Pacific Economic Cooperation (APEC) economies.

To this end, we conducted a survey of small and medium-sized enterprises. In addition, we employed a mixed methodological approach using (i) partial least-squares structural equation modeling (PLS-SEM) and (ii) content analysis of semi-structured interviews, from a strategic tripod perspective (taking into account Resources and Capacities, Industry, and Institutions variables).

The findings show that digitalization has the potential to influence business formalization positively, primarily through heightened productivity and business motivation. In addition, increased e-government services and the mitigation of institutional voids were seen to contribute to this formalization process. The study underscores a direct and favorable correlation between digital transformation and both productivity and business motivation. This connection is further emphasized by enhancements in public service provision and the

[1] This study was carried out by the Universidad del Pacífico (CECHAP - Center for China and Asia-Pacific Studies), in the context of the Asia-Pacific Economic Cooperation (APEC) and Peru's APEC Host Year in 2024. Its objective is to contribute to society by enhancing understanding of the issue of informality within the framework of digital connectivity.

2 Research team:

- Dr Cathy Rubiños: Collected the data, contributed data and analysis tools, Performed the analysis, Wrote the paper.
- Dr Alejandro Flores: Conceived and designed the analysis, Collected the data, contributed data and analysis tools, Performed the analysis, Review the manuscript.
- Dr Jorge Heredia Pérez: Conceived and designed the analysis.

*A Special recognition to Professor Jorge Heredia Pérez who, thanks to his initiative, this work was able to begin but, unfortunately, passed away before the manuscript was completed. He played a pivotal role in shaping the conceptualization of the study and will be remembered for his valuable insights and dedication to advancing knowledge in this field.

government's capacity to regulate businesses, which in turn boosts formalization. Notably, the variable of business cooperation does not exhibit a significant impact on formalization. It is also important to note that the results demonstrate contextual variations.

The qualitative analysis supplements these findings by illustrating existing relationships and stressing the pivotal role of digital connectivity across multiple dimensions. These dimensions play a critical role in facilitating digital transformation and achieving the desired impact on growth within APEC economies. Consequently, the outcomes provide a basis for formulating targeted recommendations aimed at numerous stakeholders within these economies.

TABLE OF CONTENTS:

INTRODUCTION

There is a lack of studies on the role of digital connectivity as a driver of formalization from the perspective of the businesses themselves. In this regard, a specific study would be of high relevance as there is no empirical evidence demonstrating the role of digital connectivity in the formalization process of informal enterprises from a management perspective in APEC economies with a high percentage of unregistered businesses such as microenterprises or businesses trying to grow but not abiding by the regulatory and licensing framework in the economy.

In the context of promoting the formalization of informal business, digital connectivity emerges as a possibility for technology-based businesses, and others, to facilitate the transition to formality. Also, governments can increase the business performance by streamlining procedures, allowing submission of online applications, granting permits online, and being less bureaucratic in the formalization process. On the other hand, businesses need to legitimize themselves in order to be visible and access financial services, increasing productivity and expanding market share.

However, this is a complex issue because digital connectivity could also eventually increase informality: while it helps to reduce costs and increase the value proposition of businesses, in some economies it may enable the participation of ghost labor based on temporary contracts that are invisible to regulators or have other unintended consequences. These potential effects make the study highly relevant for APEC economies.

The greatest benefit of this research is for businesses in developing economies with low productivity, insufficient growth, lack of participation in supply chains and lack of government support. In this sense, digital connectivity could be considered a new strategic and disruptive variable to encourage the formalization of informal companies, achieving better commercial and financial opportunities and increasing their productivity.

1. Introduction

Promoting the formalization of businesses operating informally or facilitating an appropriate transition to formalization has garnered widespread attention in recent years among academics, policymakers, and the government (Berkel & Tarp, 2022). The reduction of informality remains a major challenge globally (ILO, 2020), given its economic, social, and political importance (León, 2022). This is a pervasive and complex issue in the Asia-Pacific Economic Cooperation (APEC) economies in terms of production, insofar as the business sector is characterized by significant levels of informality (e.g., Peru 56.6%; Thailand 47.6%; Russia 42.1%[3]) (APEC, 2022a). Thus, informality represents a multifaceted, multicausal, structural, and heterogeneous phenomenon of a multidisciplinary nature (Cavotta & Dalpiaz, 2022), posing challenges for navigation, opportunity-seeking, and the implementation of effective policy solutions (Gallien & Boogaard, 2023).

The definition of informality can vary depending on the specific context and its evolution over time, influencing the diverse determinants that promote or favor formalization (Gallien & Boogaard, 2023). In a general sense, the concept of the informal economy[42] encompasses all economic activities carried out by workers or economic units (businesses) that, in law or in practice, are not covered or are insufficiently covered by formal arrangements (León, 2022). Informality presents various difficulties for businesses, hindering access to capital, public infrastructure, and the broader market, and causing low levels of productivity and undesirable working conditions for entrepreneurs and workers (ILO, 2020).

Yet business informality is not limited to the possession of an operating license or to a formal-versus-informal binary fallacy that takes into account neither nuances and intermediate positions nor evolving and complex contexts (De Castro et al., 2014; Silupu et al., 2022). Indeed, formal aspects of businesses are typically associated with the fulfillment of registration obligations yet addressing the informal relationships that some businesses uphold with suppliers, as well as product or process levels, is also crucial (Darbi et al., 2018; Gallien & Boogaard, 2023).

Starting in 2020, the COVID-19 pandemic compounded levels of informality, rendering it one of the most critical challenges faced by economies today (Loayza & Pennings, 2020). The phenomenon is evident in increased unemployment and economic activity in the informal sector, primarily affecting the workforce and economic units—especially small

[3] Australia 14.1%; Brunei Darussalam 33.6%; Canada 15.5%; Chile 18.7%; China 11.2%; Indonesia 17.9%; Japan 10.2%; Korea 26.1%; Malaysia 29.3%; Mexico 29.9%; New Zealand 12%; the Philippines 38.1%; Singapore 11.9%; United States 8.2%; Viet Nam 14% (APEC, 2022a).

[4] In section 3 we explore the dimensions and concepts of informality.

businesses with limited resources with which to continue operating in the market (Durst et al., 2021). This accentuates the difficulties of business transformation and consolidation in the formalization process (Klein & Todesco, 2021).

Mechanisms promoting formalization offer numerous economic advantages, such as sales opportunities, visibility, export possibilities, engagement with the domestic administration, and access to credit (Rand & Torm, 2012; ILO, 2022). However, the process may come up against obstacles that impede its success, such as greater bureaucracy, corruption, unfair competition, and a high tax burden, among other factors (Williams, Shahid, & Martínez, 2016). These obstacles can limit the benefits that businesses can derive from formalization, potentially deterring those entrepreneurs who might pursue formalization if they perceived that the benefits outweighed the costs associated with registration and yielded greater resources to their businesses (Godfrey & Dyer, 2015).

Further, society at large benefits business formalization promotion strategies (Rand & Torm, 2012). For formalization efforts to be effective, it is essential to have policies that foster private sector growth and align with the needs and characteristics of economic units, allowing adaptation to specific contexts (ILO, 2021).

There is an extensive literature on the determinants of business formalization (Cling et al., 2012; Nguyen et al., 2014; Benhassine et al., 2018; Silupu et al., 2022; Moyo, 2022). For this study, we utilize the strategic tripod approach (Heredia et al., 2023; Chen, Li, & Fan, 2018) to structure the literature, classifying determinants into the following groups of perspectives: i) the resource and capability-based perspective of businesses (Barney, 1991); ii) the institutional perspective, known as "the rules of the game" (Peng, Wang, & Jiang, 2008); and iii) the industrial perspective, referring to the five forces of industry that influence a company's actions (Porter, 1980).

Among factors related to the resource and capability-based perspective of a business, variables such as innovation (Nguyen, 2021), productivity (Korwatanasakul, 2022), the CEO's level of education, and the CEO's motivation (Benhassine et al., 2018) are crucial to the performance and benefits of formalization (Boly, 2018). From an institutional perspective, studies show that a limited perception of public bureaucracy (Fajnzylber et al., 2011; Silupu, 2022) and government support programs (Barron, 2020) are important for promoting business formalization. From an industrial perspective, the literature indicates that a favorable business environment has a significant influence on business formalization (Dieng, 2022). In addition, the promotion of unfair competition practices represents an obstacle to legalizing businesses (ILO, 2022).

Despite the significant progress in researching business formalization, our understanding of formalization processes is still limited (Zietsma et al., 2017). To fully understand formalization, much remains to be discovered about internal mechanisms and additional factors from a business perspective (Gallien & Boogaard, 2023).

One such factor is digital connectivity[5], defined as the capacity of individuals, companies and institutions to access and use digital resources across an established socio- technological spectrum. It is a key factor in the development of the digital economy, presenting opportunities and challenges for the advancement of our economies and societies today, offering means to mitigate the negative impacts of the pandemic, and enabling true digital transformation in the business environment and society. Digitalization[6] has further underlined the importance of effective digital connectivity in the way business is conducted globally in developed and emerging economies alike (Luo, 2022).

To date, there has been limited scholarly exploration of digitization's impact on the formalization of informal businesses (Korwatanasakul, 2022). While some studies suggest a measure of success when public institutions actively support the digitization of informal businesses to facilitate their formalization processes, these instances are often treated as isolated case studies. Consequently, there are clear knowledge gaps in the literature when it comes to the correlation between digitization and business formalization (Cavotta & Dalpiaz, 2022). There is a need to develop an integrative and holistic analytical framework with which to understand key variables, including digitization, the influence they have on the success or failure of business formalization processes, and how these variables relate to one other to affect a specific outcome.

The literature suggests that digitization can promote business formalization through access to digital platform services, the digitization of various operational aspects such as accounting and billing records, as well as e-government initiatives to simplify administrative procedures and promote the transition to formality. Moreover, it has been proposed that, from a legitimacy perspective, digitization could enhance business visibility, reputation, and transparency (Prasetyo, 2022). However, there is a lack of empirical studies that promote a full understanding of the phenomenon and validate it in specific cases.

Leveraging and promoting digitization can be a necessary strategy to combat informality in today's world, so it is also crucial to pay attention to difficulties related to digital infrastructure, internet coverage, and availability of adequate broadband in certain

[5] For more on the definition and scope, see Section 4: Digital connectivity in APEC economies

[6] The concepts of digitization and transformation are addressed in Section 4 in detail.

developing economies. Furthermore, businesses opting for digitization processes can strengthen their position in the digital economy and, in turn, develop their formalization. The adoption of digital technologies streamlines administrative procedures and facilitates online application submissions. In addition, embracing digital solutions makes it possible to improve access to financial services such as digital payments and online banking transactions, thus expanding the reach of businesses in the market (Strusani & Houngbonon, 2020).

1.1. Scope of the study

This study aims to explore the transition from informal to formal economy by centering on the role of digital transformation as a key factor in the business formalization process in an environment of digital connectivity. Digital connectivity is essential to creating an optimal environment for digital transformation, which impacts not only e-commerce and other digital activities but also the performance of economies (Chen, 2020; Schwertner, 2017).

Furthermore, our study aims to expand current knowledge and empirical understanding of informality by identifying relationships between digital transformation and the factors influencing business behavior (such as the business resources and capabilities-based, institutional, and industrial perspectives). In studying these relationships, we seek to deepen our understanding of informality and how these crucial elements shape how it functions. In this context, digital transformation can be considered both a disruptive new variable and a new perspective that accelerates and successfully incentivizes the formalization of informal businesses in the digital connectivity environment.

The question guiding this study is as follows: What is the mechanism by which digital transformation can affect and promote business formalization? As detailed in Section 6, we use a mixed approach comprising i) a partial least-squares structural equation model (PLS-SEM) based on a data sample of 603 businesses from APEC member economies; and ii) content analysis of 11 semi-structured interviews conducted with business experts, academics, and international organizations.

Based on this mixed methodology, we identify various mechanisms through which the digitization process relates to the transition to formality for businesses. First, our empirical analysis allows us to find that digitalization has a positive effect on productivity and business motivation, thereby increasing business formalization. However, digital transformation alone would not be sufficient to promote the formalization process. Our complementary qualitative analysis allows us to identify other mechanisms by which digitization drives formalization:

namely, improvement in the provision of public services and increased capacity from the domestic administration to oversee businesses. These variables are also captured by the quantitative results, which identify a positive relationship between digital transformation and e-government, as well as a negative relationship with institutional voids (lack of formal structures and institutional norms). The quantitative analysis was conducted by way of three models: a general one (with all the responses obtained), one for the Peruvian case, and another for the Philippines case (due to the large number of responses obtained from these two economies). In this relationship, the results differ by economy, which confirms that the variables relationship depends on other contextual variables not captured by the model, but which are discussed in this study. Likewise, depending on the digital infrastructure, it is observed that in certain cases e-government helps to increase business formalization, and to reduce institutional voids.

The results explain how these mechanisms operate and reveal their significant relationship with the study's key variables. Thus, we demonstrate that digitization plays a considerable role in promoting business formalization, but the magnitude of its importance will depend on the context in which a business operates, digital connectivity and other contextual factors.

1.2. Study Content

In Section 2, we provide a review of the existing literature on informality, addressing its various approaches, the inherent complexity of its study, and its significance in APEC economies. In Section 3, we examine the current discussion on the determinants of informality and the conditions that are explored to foster formalization. In Section 4 we highlight the importance of digital connectivity in APEC economies, exploring the concepts and importance of digitization, digitalization, and digital transformation. In Section 5 we address the relationship so far identified between digital transformation and business formalization. In Section 6, we describe the mixed methodological approach employed, with additional details on the quantitative component in Section 7 and the qualitative component in Section 8. The results are analyzed in Section 9, which leads to the elaboration of some recommendations in Section 10, followed by the presentation of our conclusions in Section 11.

2. Informality in APEC economies

The Asia-Pacific Economic Cooperation (APEC) was created in 1989 with 12 member economies, and currently has 21 members. The APEC economies account for 37% of the world's population, 62% of the Gross Domestic Product and 47% of global trade in goods

and services. Moreover, in 2022, all APEC economies grew by an average of 6.2% (StatAPEC, 2023[75]). Economic integration has allowed the member economies and different agents within them to benefit from various trade agreements. In 2024, Peru will assume Asia-Pacific Economic Cooperation´s (APEC) Host Year and will host meetings of leaders, ministers, businesspersons, and other representatives from the 21 economies. These meetings bring the participating economies closer together and also represent an opportunity to discuss experiences, studies, and strategies for economic and sustainable development.

2.1. Informality in perspective

Informality, a social and economic phenomenon that is a cause for concern in several global economies (Granda-Carvajal & García-Callejas, 2023), has been the subject of extensive discussion in recent decades (ILO, 2018), with ongoing debates on its definition and measurement (Polese, 2023). Hart (1973) defines it broadly as "all those economic units of workers and economic units that, in law or in practice, are not covered or [are] insufficiently covered by formal arrangements" (ILO, 2015a).

The informal economy, understood as the set of economic activities operating outside the framework of legal registration, taxation, and government observation, is difficult to quantify (Williams & Nadin, 2010). Informality manifests itself in different ways, reflecting labor precariousness, a proliferation of informal enterprises, and a lack of tax compliance (Williams, 2023). Likewise, companies operating in the informal economy generally do not comply with government regulations (Granda-Carvajal & García- Callejas, 2023).

The informality is associated with hiring without complying with labor regulations, while the latter signifies a lack of registration (non-registration with the competent authority or operation without a license or tax identification number) and compliance with regulations (Ulyssea, 2020).

There has been criticism of the confusion surrounding the concept of informality and its binary and simplistic "informal–formal" dichotomy (Chen et al., 2015). Indeed, organizations can display different types or degrees of business informality, such that, rather than any binary classification, it may be more helpful to consider classifications of full formality, low levels of informality, and high levels of informality (Williams et al., 2016). Thus, despite advances in its definition, there is still a need for interdisciplinary research to address its complexity.

[7] To see the other global indicators of APEC economies, check the following link: https://www.statistics.apec.org/index.php/key_indicator/index

2.2. Approaches to informality

The conceptualization of informality has been addressed from different theoretical perspectives, each offering a different approach to understanding this nuanced phenomenon. In this section, we will explain the theoretical frameworks underpinning the dualistic, structural, institutional, free-riding, and two-tiered approaches to provide a more comprehensive understanding of the diversity of perspectives that enrich the analysis of informality.

2.2.1. Dualistic Approach

The dualistic approach to informality, derived from the theories of Lewis (1954), postulates that the modern sector absorbs jobs from the traditional sector, giving rise to a marked labor segmentation (Lewis, 1954; Harris & Todaro, 1970; Fields, 2009). In this conceptualization, rural areas are associated with subsistence activities, while urban areas host modern industry. Harris and Todaro (1970) extend this model by arguing that rural workers initially enter an urban area before accessing the modern employment sector (Taiwo, 2013; Busso et al., 2021). This sequence is attributed to the scarcity of modern jobs in cities, thus shaping the dynamics of informality. The informal economy is perceived as a temporary entity (Williams & Bezeredi, 2018; Salinas et al., 2023), where workers, predominantly self-employed, are engaged in subsistence jobs (Gindling & Newhouse, 2012), experience job dissatisfaction (Aguilar et al., 2013) and lack distinctive entrepreneurial characteristics (De Mel et al., 2008). This reality mainly comprises microenterprises characterized by elementary technology, limited capital, minimal growth, and a low propensity to transition to formality (McKenzie & Woodruff, 2006; Diao et al., 2018). The individuals who lead such microenterprises generally have lower levels of human capital (Gennaioli et al., 2013), generating low productivity jobs in contrast to the formal sector (Bosch & Esteban-Pretel, 2012), which nevertheless faces taxes and regulatory costs (Gutiérrez-Romero, 2021). Moreover, informality is predominantly associated with poverty and social marginalization (Tokman, 1988; Banerjee & Duflo, 2011).

2.2.2. Structural Approach

The structuralist approach contrasts with the dualistic view, which separates the formal and informal economies. It is based on complex linkages between sectors (Moser, 1978; Castells & Portes, 1989) following economic restructuring in the 1970s and 1980s, deregulation, and technological revolution led by information and communication technology (ICT) (Castells, 2004). This led to transitions from mass to flexible production systems (Piore & Sabel, 1984), with parts subcontracted to formal or informal firms (Jones et al., 2006) within global

production networks or value chains (Gereffi et al., 2005).

According to this perspective, the informal economy became subordinate to the modern capitalist sector (Castells & Portes, 1989). Empirically, subcontracting by formal firms in global production networks establishes significant links between formal and informal economies (Carr et al., 2000; Laha, 2019; Salinas et al., 2023). In developing economies, home-based workers and small informal enterprises become part of supply chains in informal relationships based on social connections (Dannenberg et al., 2016).

2.2.3. Institutional Approach

The institutional approach, developed by De Soto (1986), takes a legal and liberal perspective, attributing informality to excessive intervention from governments in regulations and bureaucratic barriers that hinder the efficient functioning of the market. Drawing on figures such as Adam Smith, Hayek, and Adam Ferguson, De Soto bases his argument on the idea that informality arises from unfair regulations and policies that ultimately restrict business growth, especially for smaller firms. In his work "The Other Path," De Soto highlights the difficulty and costs associated with legalizing businesses and homes in Peru, citing the example that the formalization process at time of writing could take up to 298 days and cost USD1036.6 (De Soto et al., 1987). In addition to taxes, De Soto explains that the process entails a protracted bureaucratic burden.

By way of remedy, De Soto suggests that zero regulation, zero bureaucratization, and privatization should be chosen to reduce the said intervention, arguing that these approaches have contributed to growth and welfare in developed economies and can be similar drivers for developing economies. Unlike structuralist theory, which emphasizes subsistence, De Soto stresses that informal workers are not motivated by necessity but by incentives such as avoiding taxes and licenses. Their choice of informality is based on a cost–benefit assessment.

As a critique of the structural approach, the institutional approach questions policies that, according to De Soto, encourage informality rather than facilitating formalization. By proposing solutions that focus on reducing regulations, this approach offers an alternative perspective in the analysis of informality, positing how government action can affect informal economic choices (La Porta & Shleifer, 2014; Williams & Horodnic, 2016).

2.2.4. Free-riding approach

The free-riding approach to informality highlights how informal workers take advantage of

the benefits of public policies and services without contributing proportionately through taxes and regulations. This concept, advocated by authors such as Portes and Schauffler (1993) and Schneider (2005), examines how workers in the informal economy seek to benefit from government-funded infrastructure and services while evading their fiscal and legal responsibilities. It is argued that this behavior stems from a quest to maximize individual gains by avoiding the costs associated with formality. In this way, the free-riding approach highlights the complexity of the relationship between the informal sector and governments, showing how the informal economy may emerge partly in response to the economic and structural incentives present in the regulatory and fiscal environment. While it may provide immediate benefits for informal workers, it raises concerns about long-term sustainability and equity in society.

2.2.5. Two-tiered approach

Proposed by Tokman (1978) and developed by Maloney (1999), the two-tiered approach analyzes the informal economy from a perspective of heterogeneous motivations. Tokman highlights two groups of informal workers: individuals who resort to informality on a transitory basis due to a lack of opportunities in formal employment and those who choose informal work as their primary source of income. Maloney expands on this idea, suggesting that informality may have different implications for the two groups. This approach recognizes the heterogeneity within the informal economy and highlights the importance of considering informal workers' different motivations and needs. Tokman and Maloney both stress the need for differentiated policies to address the needs of the two groups, with measures aimed at improving working conditions, access to opportunities, and the transition to formal employment.

2.3. Diagnosis of informality in APEC economies

Informality is a pressing problem in APEC economies, yet its manifestation is diverse in magnitude, causes, and effects across the different members.

For example, figure 1 shows how the informal sector's contribution to gross domestic product (GDP) is considerably lower for US (8.2%) than for Peru (56.6%) or Thailand (47.6%).

Hong Kong, China; Papua New Guinea and Chinese Taipei were not included in the descriptive analysis due to limited access to up-to-date information.

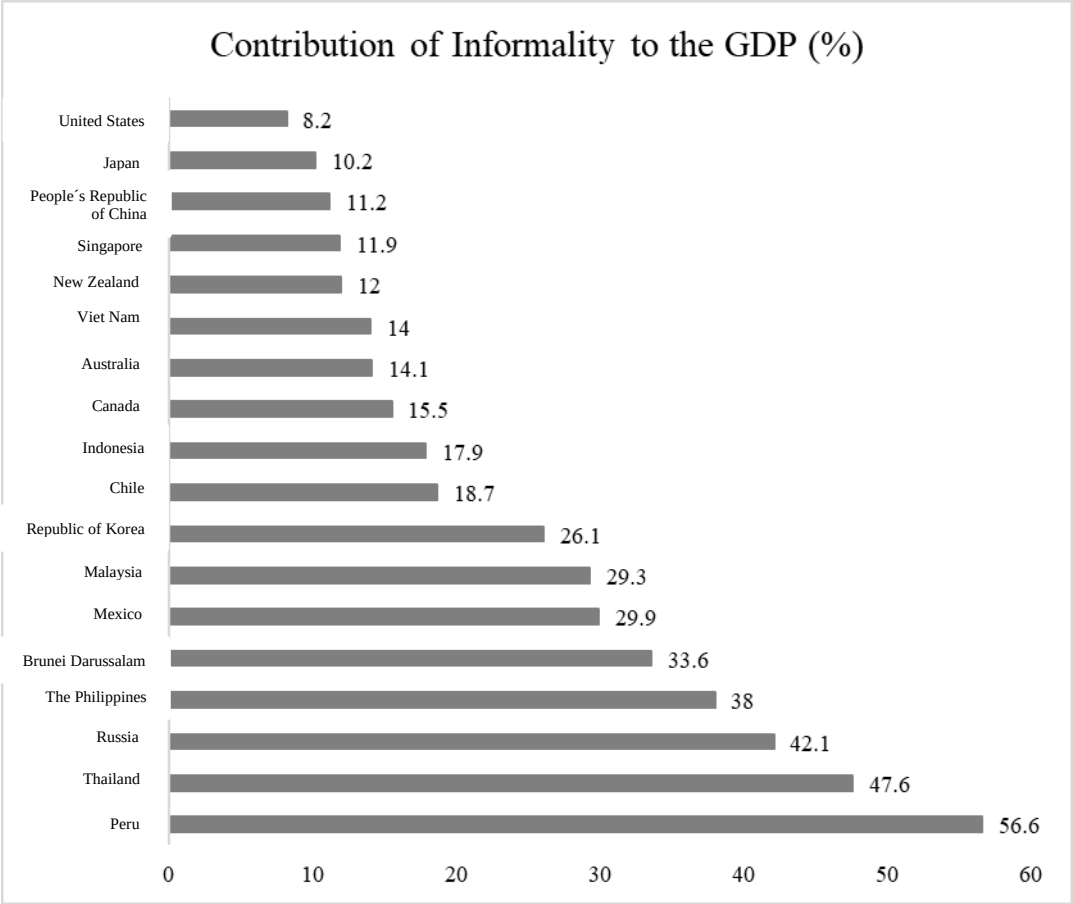


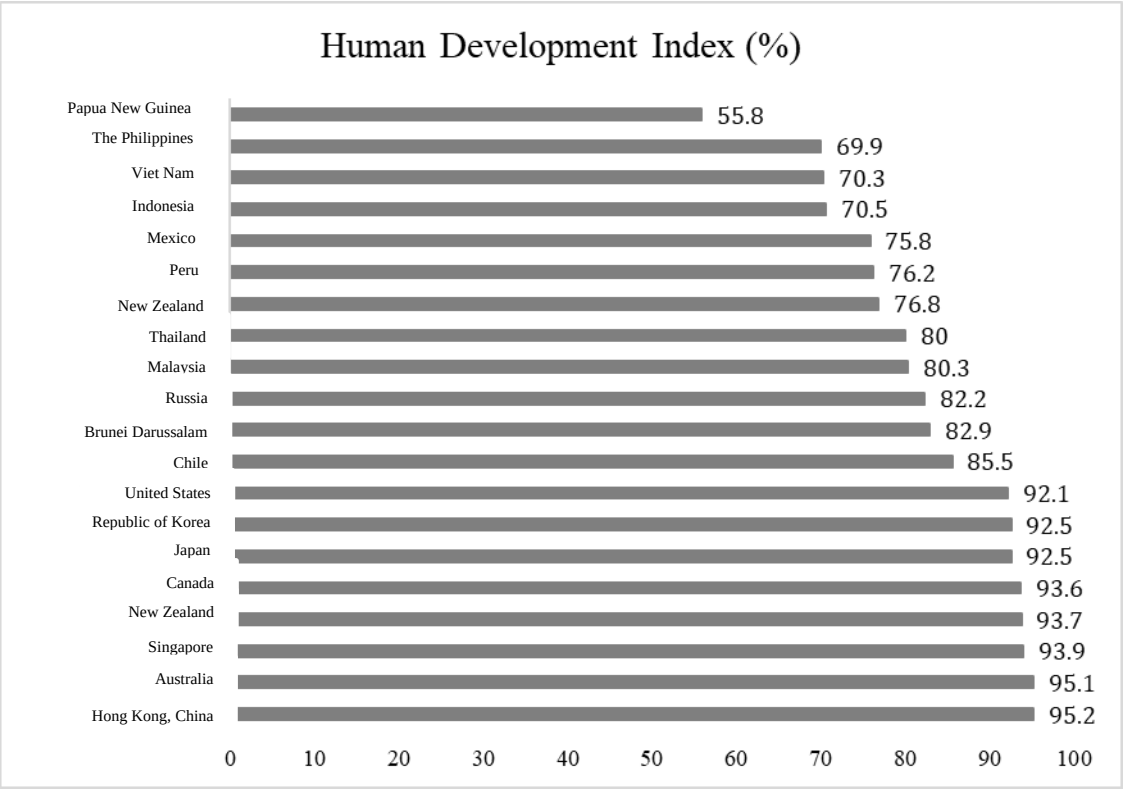
Figure 1. Contribution of the Informal Sector to Gross Domestic Product *in percentage terms)

Source: APEC, 2022a

Figure 1 also shows how informality emerges as a fundamental characteristic in developing economies and is highly correlated with less favorable human development conditions (Dell'Anno, 2010). To illustrate the importance of informality and its impact on the productivity and competitiveness of APEC economies, as well as the relationship between innovation and competitiveness, Figures 2, 3 and 4 show the relationship between informality and the Human Development Index (HDI), the levels of innovation adopted (using the Global Innovation Index for 2022), and the level of competitiveness (according to the Global Competitiveness Index 2019) for APEC economies.

Understanding informality also requires an understanding of the political, social, and economic environment. The Human Development Index (HDI), which takes into account life expectancy, education, and income, reveals a clear connection with informal employment (Williams, 2015). Thus, economies with lower life expectancy and indicators of human development are lagging behind, exhibiting more widespread informality (Vorisek et al.,

2022). As Figure 2 shows for APEC member economies by 2021, the percentages presented in the list correspond to the HDI value for each economy, where a higher value indicates a higher level of human development. For example, Hong Kong, China has an HDI value of 95.2%, indicating a high level of human development. By contrast, Papua New Guinea has an HDI value of 55.8%, denoting a lower level of human development. According to studies by Vuletin, (2008) and Vorisek et al., (2022), such HDI values explain the levels of informality in APEC economies.

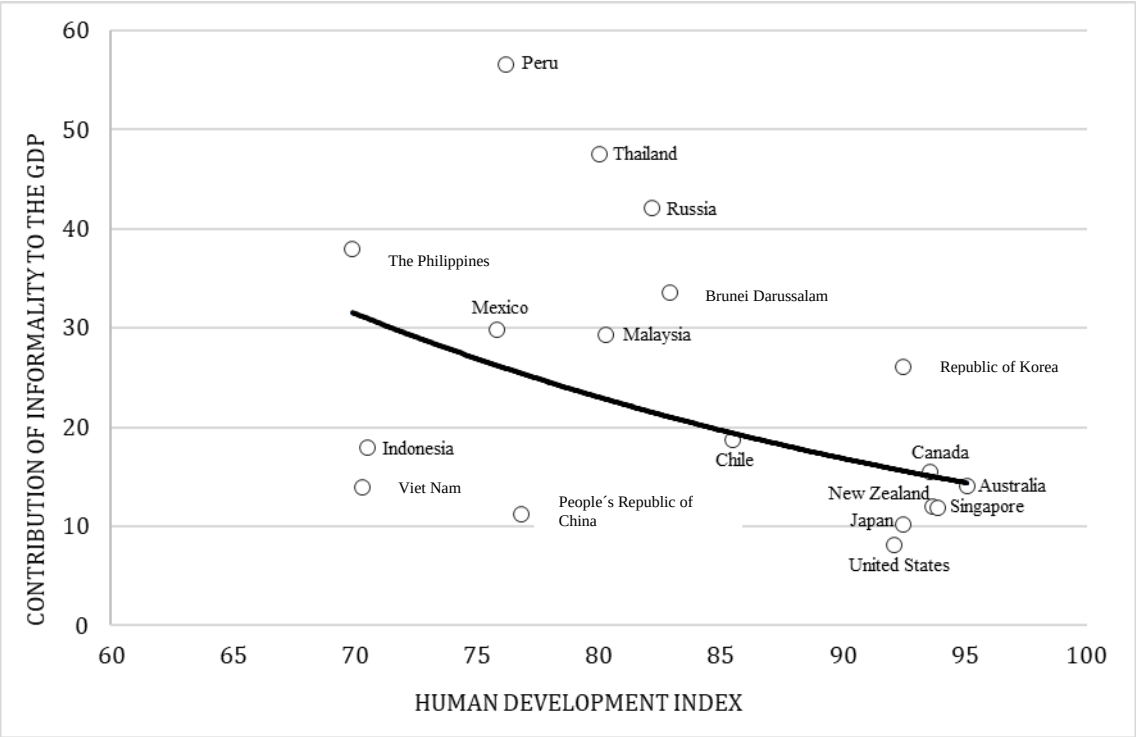


Chinese Taipei was not included in the descriptive analysis due to restricted access to current information.

Figure 2. Human Development Index of APEC Economies

Source: United Nations Development Program (UNDP-2021)

Thus, a negative value would indicate that APEC economies with a higher level of informality correlate with a lower Human Development Index (see Figure 3). The scatterplot between the two variables indicates a moderate correlation, equivalent to a correlation coefficient of -0.45. This statistical association reveals the importance of addressing informality and promoting economic growth and social inclusion within economies.



Hong Kong, China; Papua New Guinea and Chinese Taipei were excluded from the correlational analysis due to constraints in accessing the latest available information.

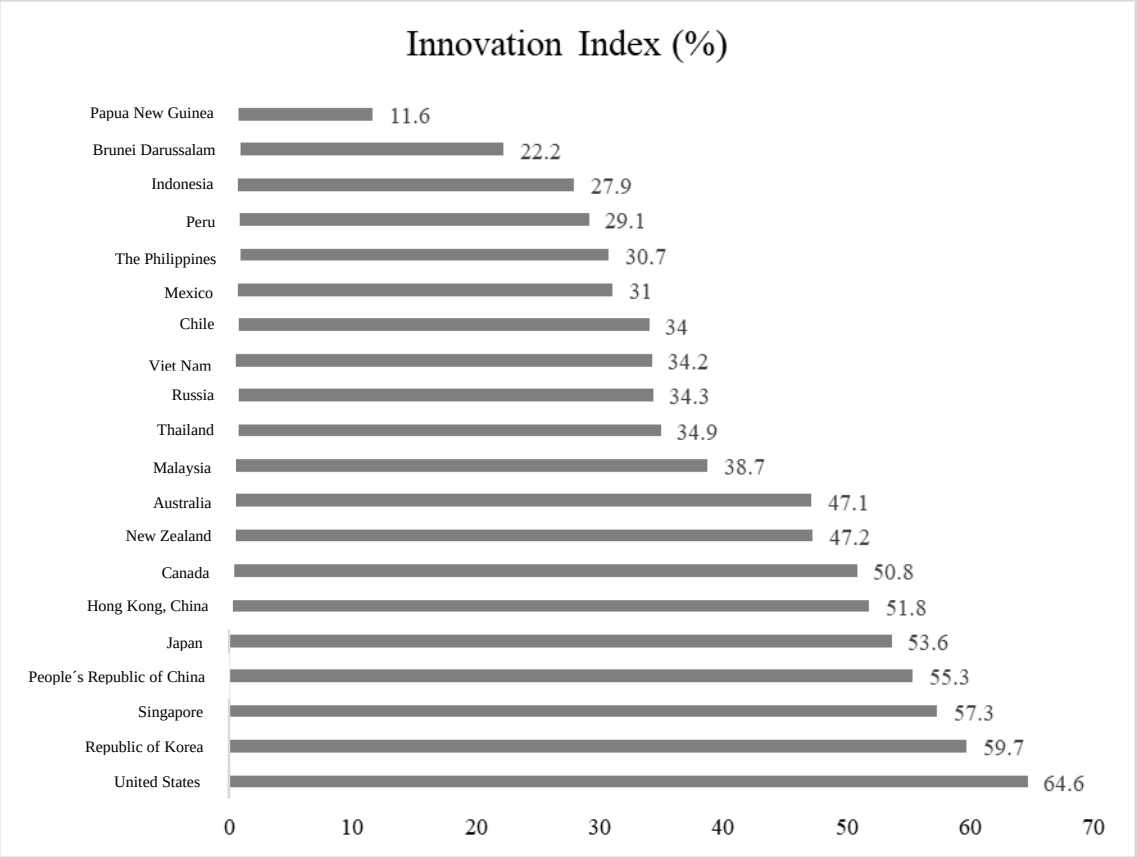
Figure 3.Correlation between the Contribution of Informality to GDP and the Human Development Index across APEC Economies

Source: United Nations Development Program (UNDP-2021) and Stepping Outside the Shadows: Informality and Digitalisation (2022)

Informality in developing economies absorbs approximately 70% of jobs, significantly affecting productivity and competitiveness (Taymaz, 2009; Hendy & Zaki, 2013; La Porta & Shleifer, 2014; Gutierrez & Rodriguez-Lesmes, 2023). Informal enterprises, characterized by limited productive resources compared to their formal counterparts, negatively affect competition. Informality is closely associated with competitiveness and productivity in economies, and its adverse impact on competitiveness is manifested through unfair trade practices, through which it becomes an obstacle to economic development (Kouakou, 2023).

In addition, several studies bear out the important role of innovation (Adu-Gyamfi et al., 2023; Gault et al., 2023). We start with the consensus that innovation is crucial for companies to obtain a competitive advantage (Lyu et al., 2023) and to increase competitiveness and productivity. Figure 4 shows the level of innovation adopted in APEC economies. According to the Global Innovation Index for 2022, Korea is in the lead in this regard (95.29%), followed by New Zealand (94.32%); Australia (94.05%); and United States (91.51%). Chile

is the best positioned economy in the Americas (82.59%), followed by Mexico (72.91%) and Peru (70.83%). Finally, according to the ranking, Viet Nam (67.87%); the Philippines (65.23%); and Papua New Guinea (32.3%) are the economies with the lowest adoption of innovation.

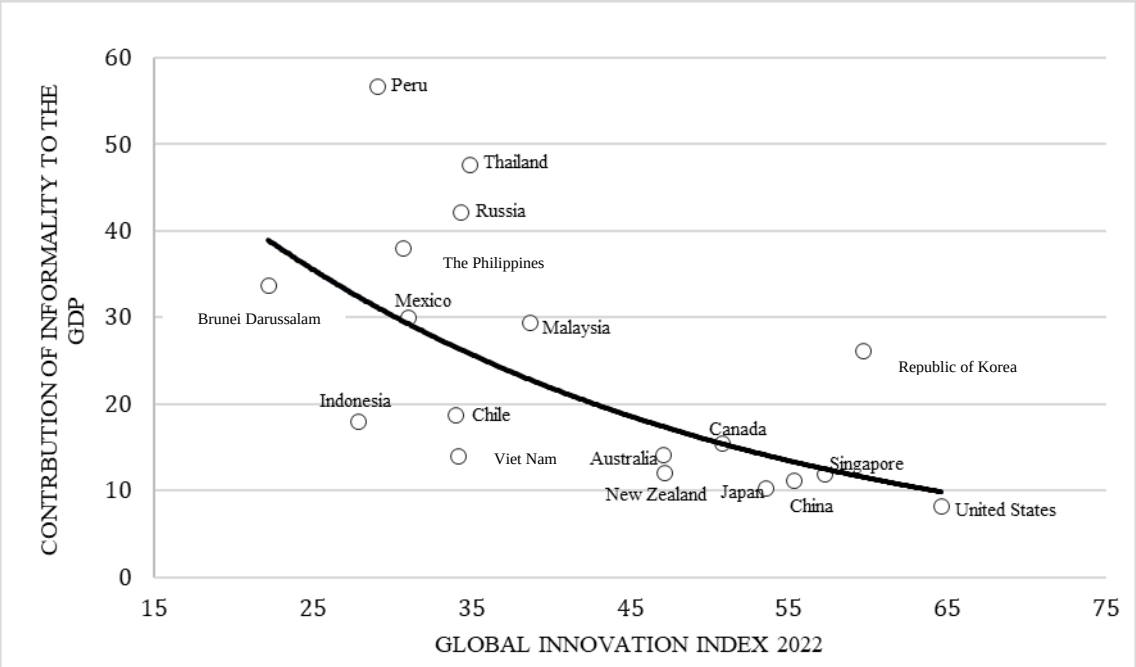


Chinese Taipei was not included in the descriptive analysis due to restricted access to current information.

Figure 4. Innovation Index Across APEC Economies

Source: Innovation Index 2022

Figure 5 shows the degree of association between levels of informality and the overall innovation index. This negative correlation illustrates that lower levels of innovation are associated with higher levels of informality in APEC economies. The correlation coefficient of -0.63 is important for understanding the relationships that explain informality.

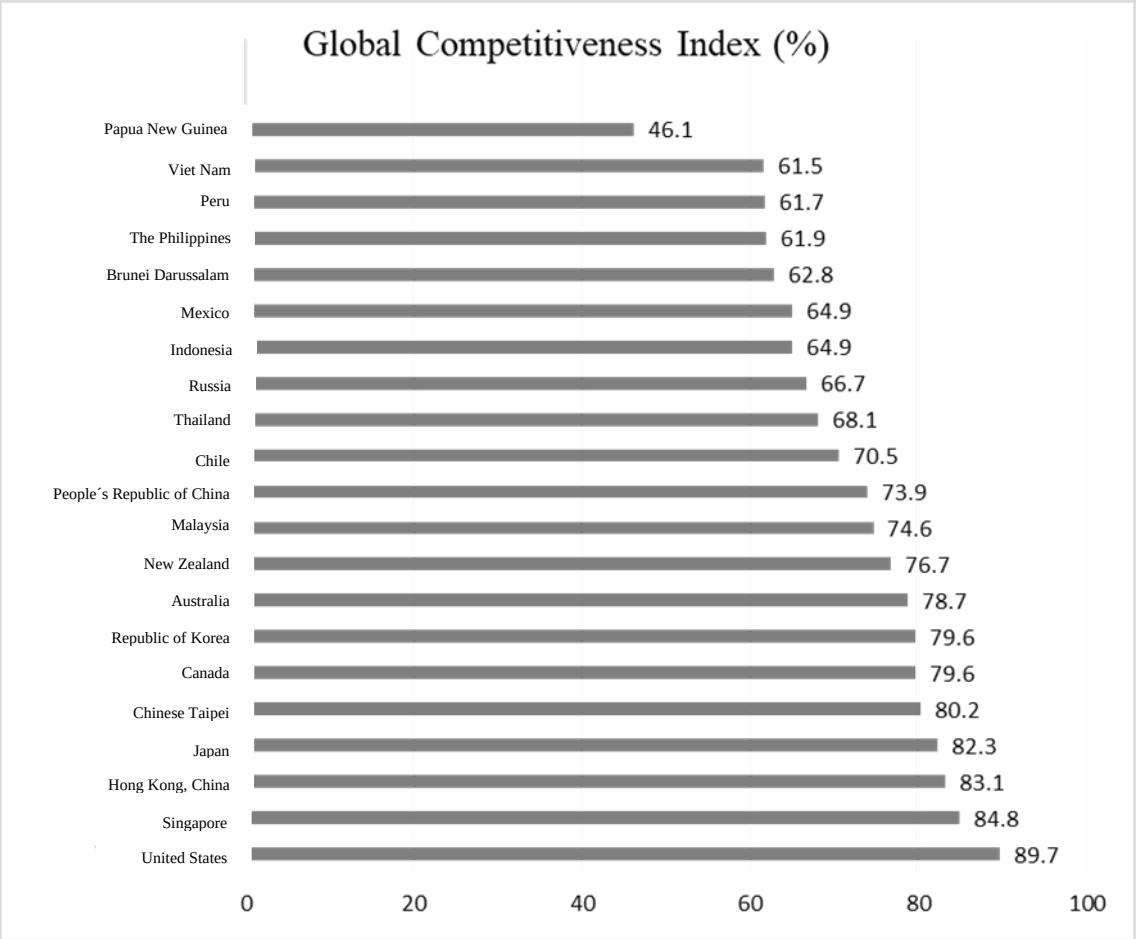


Hong Kong, China; Papua New Guinea and Chinese Taipei were excluded from the correlational analysis due to constraints in accessing the latest available information.

Figure 5. Correlation between the Contribution of Informality to GDP and the Global Innovation Index across APEC Economies

Source: Global Innovation Index 2022 y Stepping Outside the Shadows: Informality and Digitalisation, 2022

To complement Figure 6, we show the level of competitiveness of APEC economies. There is a large literature that supports the relationship between the level of competitiveness and the level of informality in economies (Abramo, 2022; Laguna et al., 2023). According to the Global Competitiveness Index 2019, United States (89.7%) is in first place, followed by Singapore (84.8%) and Hong Kong, China (83.1%). Chile (70.5%), is the best ranked Latin American economy, followed by Mexico (64.8%) and Peru (61.7%). Finally, Viet Nam (61.5%) and Papua New Guinea (46.1%) are the economies with the lowest levels of competitiveness, respectively.

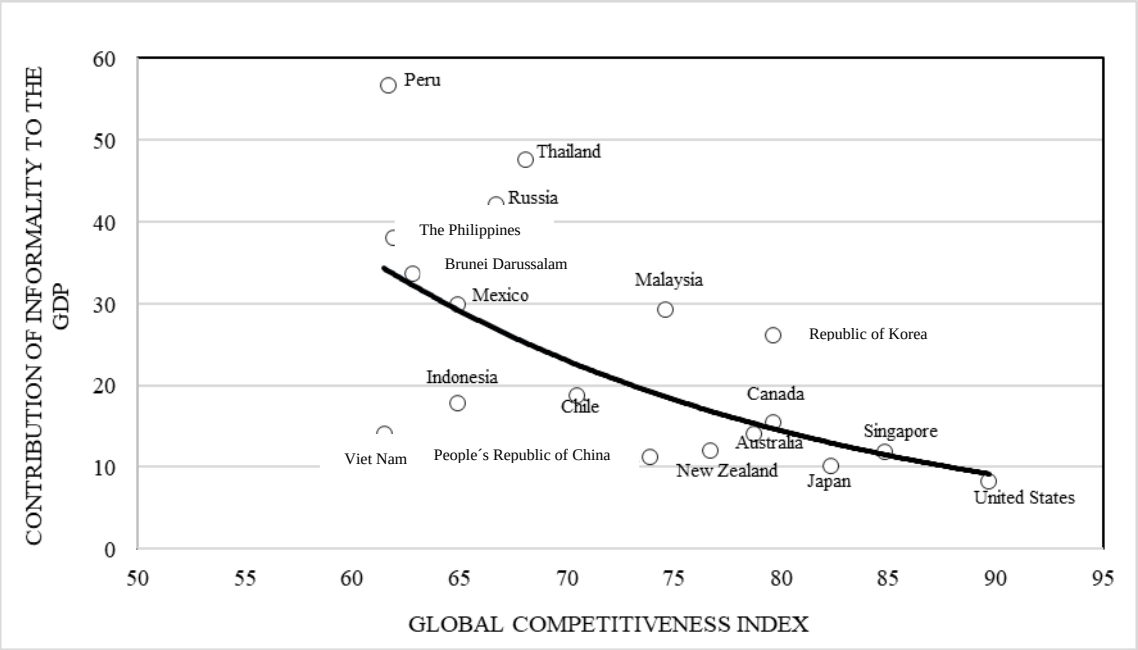


Information available for all APEC economies.

Figure 6. Global Competitiveness Index across APEC Economies

Source: Global Competitiveness Index 2019

Figure 7 shows a relationship between the global competitiveness index and levels of informality. The fit line indicates a correlation between the two variables, with a correlation coefficient of -0.65. This negative statistical correlation highlights the importance of addressing informality by improving competitiveness capacity in APEC economies.



Hong Kong, China; Papua New Guinea and Chinese Taipei were excluded from the correlational analysis due to constraints in accessing the latest available information.

Figure 7. Correlation between the Contribution of Informality to GDP and the Global Competitiveness Index across APEC Economies

Source: Global Competitiveness Index 2019 and Stepping Outside the Shadows: Informality and Digitalisation, 2022

3. Transition from informality to business formalization

3.1. Business formalization in context

Informality is one of society's most prominent structural problems, exhibiting a multi- causal complexity with diverse economic and social impacts, especially in emerging economies. This section explores some of the main stylized aspects of business informality in order to better understand formalization processes.

Many studies have addressed informality and its possible causes, highlighting bureaucracy, tax burdens, low productivity, excessive regulations, lack of economic development, and limited financial inclusion as the main contributing factors (Capasso et al., 2022). Ulyssea (2020) stresses the need to understand the determinants of informal employment and informal businesses in order to study this phenomenon, in a study aimed at understanding the formalization of these companies and promoting effective policies to combat informality and labor precariousness. There is agreement in the literature that, on average, it is small firms,

with less skilled workers and below-average wages, that adopt informality due to their low productivity and limited access to financial services (De Paula & Scheinkman, 2011; La Porta & Shleifer, 2014).

Although there is evidence of heterogeneity in the results based on the informality indicator and the estimation method used, it is recognized that business formalization can have several positive impacts, such as cost reduction and increased organizational performance. Drawing from the existing literature, we will detail the determinants and attractions that influence business formalization below. The empirical evidence indicates that red tape bureaucracy affects entrepreneurs' formalization decisions (Silupu et al., 2022). Likewise, factors such as entrepreneurial culture (Williams & Nadin, 2013), company size (Coles et al., 2023), competition (Weng et al., 2021), corruption (Zylfijaj et al., 2020), business environment (Diaz et al., 2018; Nohoua, 2021), innovation (Dufour & Son, 2015), and technology (Williams, 2023) also play a crucial role. Shamsuzzoha and Tanaka (2021) argue that productivity and human capital are determinants of business formalization. Lay and Tafese (2020) analyze productivity dynamics in formal and informal firms, showing evidence that informal firms tend to have lower productivity. Loayza (2019) proposes that improving labor productivity and institutional efficiency and streamlining the tax system can make formality more attractive. Institutional arrangements, both formal (laws and regulations) and informal (values and behaviors), also play a crucial role in business formalization. Traore (2021) identifies simplification of procedures and access to formal credit as drivers of formalization.

According to institutional theory, asymmetries between formal and informal institutions may influence entrepreneurs' decisions to remain informal (Williams & Horodnic, 2016). The importance of institutional theory is highlighted in many studies, such as those of Silupu et al., (2022), which explores the asymmetries of formal and informal institutions as determinants for operating in the informal sector. Silupu et al. (2022) argue the crucial role of institutions and regulatory compliance in the formalization process of firms, showing that the greater the ease of the bureaucratic procedures, the more motivated entrepreneurs will be to formalize.

At the tax level, a large volume of research and policies in developing economies (Mwombeki 2023) and developed economies (Nohoua, 2023) have sought to encourage business formalization by promoting measures such as eliminating initial registration costs and reducing regulations (Gallien & Boogaard, 2023). However, according to Maloney

(2004), these efforts have yet to make a significant impact, as firms—especially in developing economies—are still choosing to remain informal because they perceive the benefits to outweigh the costs and taxes associated with formalization.

In terms of benefits, business formalization positively impacts performance, efficiency, and working conditions, reducing ambiguity and uncertainty and improving service levels. Specific research, such as that of Rand & Torm, (2012), highlights that simplifying business registration procedures increases their performance. In addition, small and young businesses can also benefit from formalization, according to Benhassine et al., (2016). However, it must be recalled that the terms and benefits of formalization may vary depending on the performance measure used.

The complexity is increased when greater diversity is factored into the definition of business informality, abandoning the binary fallacy of "formal or informal" and adopting a graded perspective. Studies such as Mbaye et al. (2020), Williams & Bezeredi (2018b), and Williams and Kedir (2016) argue that the definition of business informality is multidimensional, based on firm size, number of workers, legal and tax registration, access to finance, and ownership of premises. Complexity also manifests itself in the variability of measures depending on the institutional environment, as argued by Mbaye et al. (2020) in the African context.

Business informality is a multifaceted phenomenon with multiple causes and consequences. Understanding the factors influencing formalization is essential for designing effective policies and strategies to foster a more formal and resilient business environment.

3.2. Strategies for business formalization

In part, business decisions regarding formalization are based on a cost–benefit analysis. In this regard, domestic strategies to promote formalization have undergone a notable change in recent years, and now focus mainly on reducing the barriers that hinder this process. This has been achieved by implementing new tax schemes that simplify the fiscal and administrative burden, aiming to encourage the formalization of companies. In addition, governments in several economies have designed specific policies to promote business formalization. These policies go beyond mere tax simplification and include measures such as linking formalization with easier access to credit, participation in export activities, and opening opportunities to access new markets. A more comprehensive approach was proposed by the International Labor Organization (ILO) at its 2015 International Labor Conference,

which gave rise to Recommendation No. 204 on the transition from the informal to the formal economy. This recommendation proposes comprehensive strategies, including: a) facilitating the transition of workers and economic units from the informal to the formal economy, respecting the fundamental rights of workers and guaranteeing opportunities for income security, livelihoods, and entrepreneurship; b) promoting the creation, preservation, and sustainability of enterprises and decent jobs in the formal economy, ensuring coherence between macroeconomic, employment, social protection, and other social policies; and c) preventing the informalization of jobs in the formal economy. These strategies are fundamental to achieving successful and sustainable formalization.

4. Digital connectivity in APEC economies

The fast-growing global trend of digital connectivity has brought about very significant positive consequences for society. This impact is also visible in terms of formalization across all economies, in line with our argument that the increased access to digital tools affects the formalization process at all levels. As mentioned earlier, this study aims to identify these positive effects. To this end, in this section we will focus on contextualizing and explaining the role of digital connectivity, assessing its situation for APEC economies, and identifying the relationship we hypothesize is present between it and digital transformation. In this study, we contend that digital connectivity impacts the levels of digital transformation, and in this way its effects on formalization or levels of informality can be identified. Finally, it should be noted that this study draws from the APEC's perspective on digital connectivity (with regard to the physical, institutional, and social aspects).

4.1. Digital connectivity in context

The digital environment has become a highly relevant element for society in general. Mobile applications, social media, the internet, and cloud services, among other technological tools of Industry 4.0, play a fundamental role as critical mechanisms for business progress. In this regard, digital connectivity is defined as the capabilities of people, companies, and institutions to access and use digital resources spanning an established socio-technological spectrum. Digital connectivity plays a crucial role in economic development, productivity, and the promotion of innovation. It generates a wide range of benefits for society by driving the digitization of businesses and achieving more robust regional integration (Lynn et al., 2022). In addition, digital connectivity encompasses various technologies that enable data

transmission in digital formats through different physical channels to virtually any location (Puig, 2020).

Despite public and private sector efforts, the persistent digital divide in promoting telecommunications services between rural and urban areas poses a significant challenge for emerging economies. A solid digital infrastructure and advanced digital capabilities facilitate adoption of connectivity technologies. However, there are differences based on economic, geographic, and broadband coverage factors, contributing to the heterogeneity in digital connectivity between regions. The domestic administration drives different telecommunications projects to promote broadband throughout the territory with the support of the private sector for the deployment of digital infrastructure.

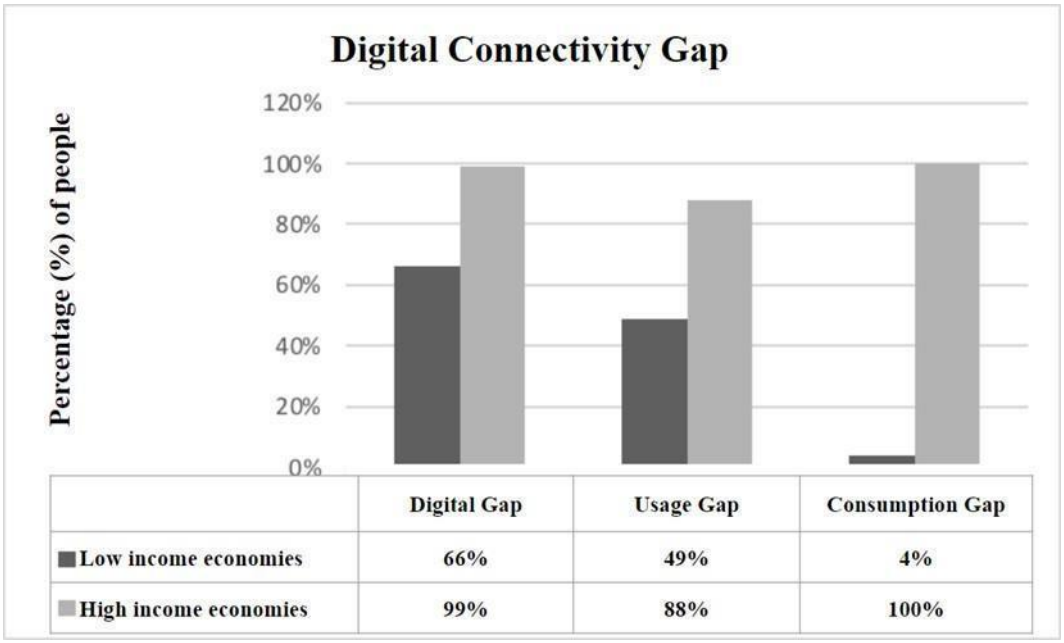
It is thus essential to ensure adequate geographic coverage to boost connectivity and digital infrastructure, which in turn encourages greater adoption of the digital economy. Some measures to achieve this include expanding broadband, deploying access networks, and accessing 5G (fifth generation) technology services to favor connectivity throughout society. In the context of crises such as the COVID-19 pandemic, digital connectivity became a crucial tool to maintain societal resilience and business continuity. Despite this increase in the use of digital instruments, several challenges arose among digital infrastructure providers and broadband operators, as well as the implementation and deployment of the 5G network (Strusani & Houngbonon, 2020). The implementation of 5G technology enables instantaneous and high-quality connectivity throughout the network, enabling optimal end-to-end communication over the internet (Dolgui & Ivanov, 2022). Likewise, broadband, a high-capacity connection for the constant transmission of voice, video, images, and data, evolves according to user preferences and needs. Among broadband's social and economic benefits are greater development in economic sectors, increased productivity, and economic growth (García Zaballos et al., 2021). In addition, broadband connection plays a fundamental role in the intellectual development of cities by facilitating the adoption of advanced information and communication technologies, which stimulates the emergence of new business models (Luo et al., 2022).

4.2. Diagnostic of digital connectivity in APEC economies

The regions belonging to APEC contribute 61% of global GDP and 47% of international trade (Chan, 2022), with major global participation. At the economic level, the United States;

China; and Russia are economic powers territorially, while the United States; Japan; and China are in an industrial sense. APEC brings together economies displaying robust growth from the East Asian region (China; Hong Kong, China; Korea; Malaysia; Singapore; Chinese Taipei; Thailand; and Viet Nam), as well as key economies from Oceania (Australia and New Zealand) and Latin America (Chile; Mexico; and Peru).

Internet connectivity brings us closer to understanding digital inclusion in different economies. Some developing or low-income economies present greater shortcomings in digital inclusion than developed economies. In 2019 the World Bank, through its *Innovative Business Models for Expanding Fiber-Optic Networks and Closing the Access Gaps* report, argued that the digital divide in developing regions takes three forms: the coverage gap (lack of digital infrastructure), the usage gap, and the consumption gap[86]. Figure 8 presents a comparative graph (low-income and high-income economies) of the digital connectivity gap.



	Digital Gap	Usage Gap	Consumption Gap
Low income economies	66%	49%	4%
High income economies	99%	88%	100%

Figure 8. Digital connectivity gap.

The coverage gap is the percentage of the population beyond the reach of a broadband signal; the usage gap is the percentage of the population that does not use the internet despite living within reach of a broadband signal; the consumption gap is the deficit in percentage terms between average data consumption and the proposed standard of 5 GB per month.

[8] For further details, see https://wdr2021.worldbank.org/en/stories/connecting-world/. *Source: Banco Mundial (2019), "Innovative Business Models for Expanding Fiber-Optic Networks and Closing the Access Gaps", Alianza para el Desarrollo Digital, Banco Mundial, Washington, DC.*

Similarly, the Inter-American Development Bank (IDB) calculates the global Broadband Development Index (BDI). This indicator aims to measure the digital divide for Latin American economies and other economies in different regions as a reference. (It does not calculate the Index for all APEC economies.) The index comprises four relevant aspects for developing digital connectivity in each economy: i) public policies and strategic vision, ii) strategic regulation, iii) infrastructure, and iv) applications and training, while taking into account various access, regulatory, and infrastructure indicators to determine the level of progress of digital connectivity. The index can take values from 1 to 8 for the aggregate and its four components (García Zaballos et al., 2022). Table 1 shows the score obtained by 12 of the APEC economies in the total index and in the Infrastructure component, which considers aspects such as access and coverage ratio at the household level.

Table 1: IDBA 2022 Rankings for APEC economies

Economy	Infrastructure Component	Total IDBA	Global Ranking
Australia	5.98	6.44	14
Canada	6.14	6.27	24
Chile	5.58	5.75	34
China	5.96	5.87	32
Indonesia	4.26	4.50	48
Japan	6.70	6.32	19
Korea	6.71	6.46	12
Mexico	4.47	4.76	44
New Zealand	6.00	6.36	15
Peru	4.04	4.50	49
Russia	5.59	5.63	35
United States	6.43	6.53	10

Brunei Darussalam; Hong Kong, China; Malaysia; Papua New Guinea; the Philippines; Singapore; Chinese Taipei; Thailand and Viet Nam were not factored into the construction of the index.

Source: Broadband Development Index 2022 Annual Report.

In general terms, it is evident that North American and Asian economies have a better score for the index and, therefore, a better position in the global ranking. In contrast, the Latin

American economies that make up APEC are in lower positions and have lower scores, especially in the infrastructure component. A clear example is the percentage of households with internet access in these economies. In Peru, 48.7% of households had access to the internet in 2022, while in Latin America the average was 66.2%. If we look at the level for OECD economies, this figure reaches 90.3% (García Zaballos et al., 2022).

In addition, the International Institute for Management Development (IMD) publishes an annual global competitiveness ranking for 64 economies that takes into account different aspects of development for each economy, and one of its components considers technological infrastructure as an essential pillar of the development of domestic competitiveness. The component measures each economy's technological infrastructure based on broadband technology, internet access, number of communication technology users, related public–private partnerships, cybersecurity, among other aspects (IMD, 2023). Table 2 shows the rankings for 17 APEC economies included in the study:

Table 2. IMD Global Competitiveness Ranking, 2023

Economy	Ranking Global
Australia	32
Canada	18
Chile	30
China	9
Hong Kong, China	5
Indonesia	35
Japan	33
Korea	23
Malaysia	16
Mexico	62
New Zealand	39
Peru	61
The Philippines	48
Singapore	3

Chinese Taipei	8
Thailand	25
United States	12

Brunei Darussalam; Papua New Guinea; Thailand, and Viet Nam were not factored into this ranking.

Source: IMD World Competitiveness Ranking 2023

The Netherlands obtained first place in the rankings and Denmark second place for this technological infrastructure component. The APEC economies included in this report are distributed throughout the rankings; Asian economies do not necessarily occupy the uppermost spots, but Latin American economies are generally in lower positions.

In this section, a pattern can be seen among the levels of digital connectivity for APEC economies. According to the reports presented in this section, it can be seen that among higher-income economies and those considered more developed, there is a higher level of connectivity and digital development in general, while in lower-income and developing economies the penetration of digitization and access to technological services is lower. One mechanism that may explain this trend is the heterogeneity of the level of investment in technological infrastructure, which is exactly what is observed in the index and the rankings presented; economies with lower levels of technology investment must prioritize digital connectivity or actively seek to make it available to all their citizens. This shows the importance of the role of governments in developing digital connectivity, both through public investment and the promotion of private investment in this sector.

4.3. Digital connectivity and digital transformation

Digital connectivity plays a vital role in the context of digital transformation. The ability to establish effective connections and communications is essential for the successful adoption of digital technologies and the reinvention of operations and business models. Digital connectivity not only refers to the interconnection of devices and networks but also enables the creation of new business opportunities, improved productivity, and innovation. In today's business environment, digital connectivity has become a pillar for value creation and the development of digital transformation. Therefore, an appropriate level of digital connectivity will enable faster and more effective adoption of digital technologies, which in turn will drive economic growth and innovation in the APEC region. In this regard, economies that invest in high-quality digital connectivity infrastructure and policies that promote the adoption of digital technologies will be better positioned to take advantage of the opportunities the digital world offers.

Digital transformation is a strategic process by which organizations adopt digital technologies to improve and reinvent their operations and internal and external experiences (Culot et al., 2020). Chen and Tian (2022) point out that digital transformation represents innovative change in companies, altering how companies operate to generate profits, reduce risks, and improve customer relationships (Li, 2018). Along similar lines, Verhoef et al. (2021) argue that digital transformation necessitates two prior stages: digitization and digitalization. Although the two terms are conceptually distinct, they are closely related. According to the literature review, digitization converts analog information into digital (Ramaswamy & Ozcan, 2016). Moreover, Verhoef et al. (2021) argue that activities or tasks such as (i) digital forms in ordering processes, (ii) the use of digital surveys, and (iii) the use of digital applications for internal financial statements are examples of digitization. Digitization enables digitized processes but does not change or add value-creating activities. Second, digitalization is more advanced than digitization (Verhoef et al., 2021). In addition, it employs tools to improve company efficiency and process improvement, and uses technology to modify traditional business processes and create new communication and storage channels (Verhoef et al., 2021). Digital transformation is understood as an enterprise-wide change that drives new business models.

When studying the relationship between digital connectivity and digital transformation, it is essential to recall that connectivity encompasses several aspects, and to increase access to digital tools, given that all dimensions of connectivity must be promoted. According to the latest research trends, the effectiveness of connectivity in fostering digital economies depends primarily on three pillars: physical connectivity, institutional connectivity, and person-to-person connectivity (APEC, 2022b). First, physical connectivity refers mainly to the available infrastructure to ensure access to digital tools. It is crucial that this infrastructure is constantly upgraded to provide uniform connectivity conditions across all economies, preventing any stagnation with outdated technology. Second, institutional connectivity refers to the regulatory framework and measures adopted by governments to promote digital connectivity in each economy. In addition, international cooperation is highlighted as beneficial in developing digital connectivity in this respect. Finally, person-to-person connectivity increases when individuals actively use digital tools to participate in the digital economy. It is considered important here for individuals to develop their digital skills, and efforts should be made to increase the population's trust in new technologies so that they can fully benefit from their advantages (APEC, 2022b).

5. Digital transformation and business formalization

In the world of work, the continuous transformations driven by new technologies are evident (Vial, 2021). These technologies modify business models in economic units and have significantly impacted formalization, primarily through improvements in public tax policies and e-government (Kring & Leung, 2021).

E-formalization, an emerging policy area, involves a complex interplay between e-government, the development of labor market-related e-services, and inclusive development (Kring & Leung, 2021). This approach relies on investments in technology and innovation, especially in the digital economy, and policy frameworks that support the transition to the formal economy.

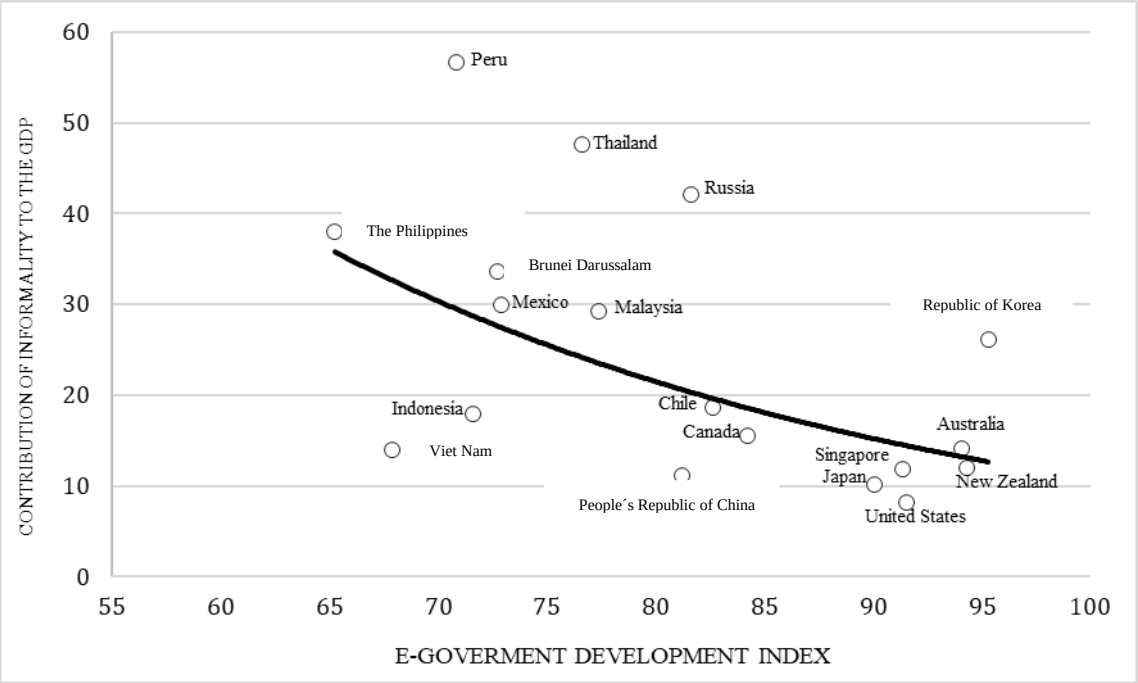
Chacaltana, J., Ruiz, C., & Vezza, E. (2022) highlight the importance of technology in the labor market, analyzing the active participation of public institutions and policies to facilitate the transition to business formality. Practical examples include e-government, which allows electronic registration of companies and electronic tax payments, simplifying traditional operations. The study by Roy and Khan (2021) explores the relationship between tax digitization and business formalization, pointing towards a positive effect for large companies and a potential negative impact on small companies with a lower digitization capacity.

Lavado (2022) proposes e-formalization as a perspective for public policies, especially in economies lagging in digital transformation, such as Peru. In contrast, Kring and Elder (2022) present a study of Korea, an advanced economy, highlighting the fundamental role of digitalization in facilitating the transition to formality.

While studies at the macroeconomic and institutional levels are abundant, there is a need for more research that addresses firms' internal motivations to formalize through new technologies. Prasetyo (2022) analyzes digital platform strategies from a microeconomic perspective, while Mishra & Tripathi, (2020) highlight the importance of digital financial services. Nguimkeu and Okou (2021) stress the advantages of digital technologies to increase productivity and suggest that, in addition to technologies, an enabling business environment and adequate regulations are essential for formalization.

In sum, various perspectives have widely explored the relationship between new technologies and informality. Understanding how these technologies transform public policy is crucial for policymakers to address informality effectively.

Figure 9 shows the dispersion between informality levels and the E-government Development Index 2022. In general, APEC economies with higher levels of digitalization have an association with lower levels of informality, and a correlation with a value equivalent to -0.55. This information can be useful for understanding how digital connectivity relates to making strategic decisions that address informality.



Hong Kong, China; Papua New Guinea and Chinese Taipei were excluded from the correlational analysis due to constraints in accessing the latest available information.

Figure 9. Correlation between the Contribution of Informality to GDP and the E-Government Development Index across APEC Economies

Source: E-Government Development Index, 2022

6. The role of digital transformation in business formalization.

6.1. Relationship between digital transformation and business formalization

This study aims to explore and understand the role of digital transformation in business formalization. According to the previous sections, there needs to be more empirical evidence to explain the relationship between these two variables in APEC economies.

In this regard, an empirical study has been conducted on the transition from informality to formality in a context of digital connectivity. The literature that draws from on the business resources and capabilities-based perspective, has argued that productivity plays an important role (Loayza, 2008), as does the motivation to grow (Olomi et al., 2011). From an institutional perspective, the implementation of e-government to expedite different administrative processes also influences digitization (Van et al., 2019). Another key consideration is the relationship between formal institutional voids within formalization (Perry et al., 2007). Finally, from an industry perspective, business

cooperation has been found to enhance the attractiveness of formalization (Zylfijaj et al., 2020). Given this background, in Figure 4 we present a theoretical model for this study.

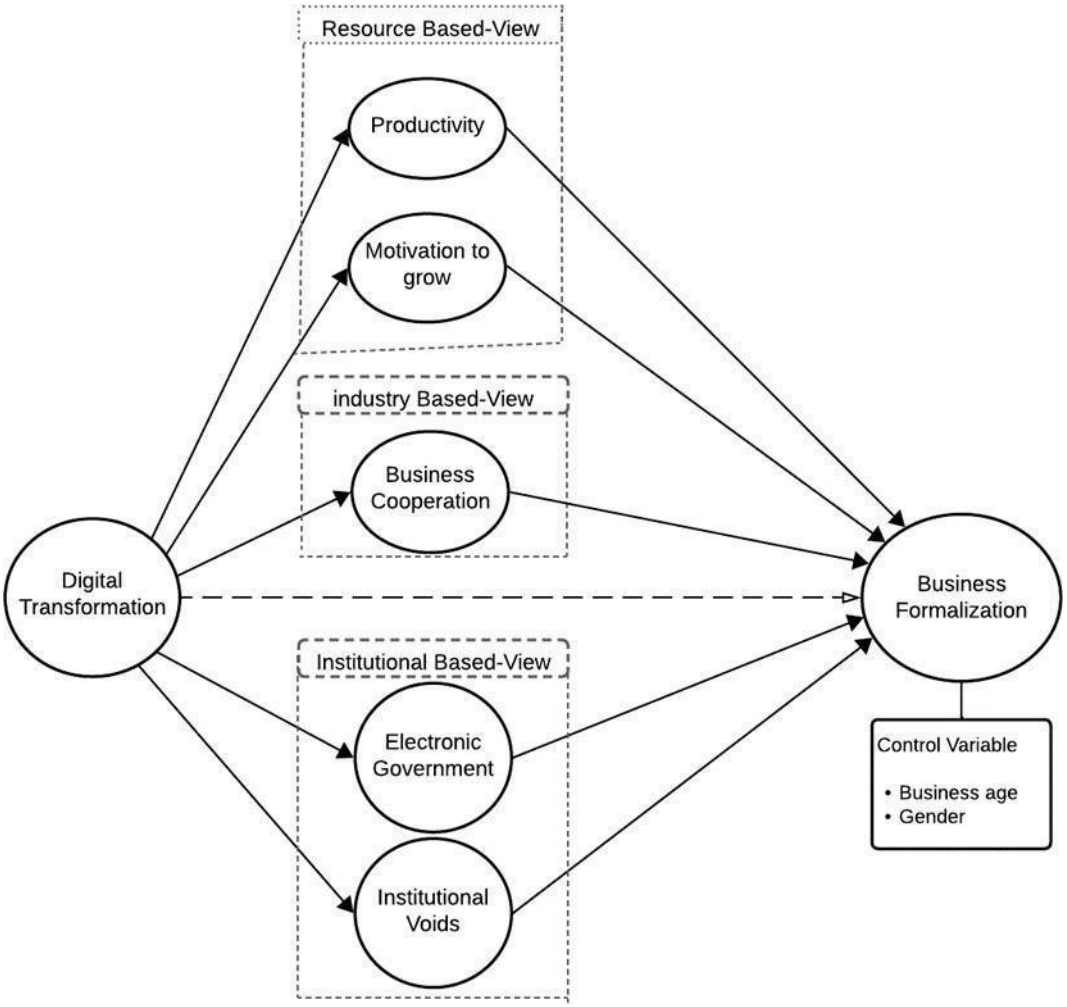


Figure 10. Proposed Model

Source: compiled by authors.

6.2. Analysis model: institutions, industry, and resources and capabilities.

This study adopts the strategic tripod approach (Heredia et al., 2019), which presents an integral perspective to analyze entrepreneurial behavior by incorporating the dimensions of institutions, industry, and resources and capabilities. As we detail below, this model allows for a holistic examination of the interrelations between internal factors, industry characteristics, and institutional context, which play a crucial role in the entrepreneurial decision-making process vis-a-vis formalization.

6.2.1. Institution-based perspective

Roberts (1992) empirically tested Freeman's (1984) perspective, arguing that government capacity, through regulation, influences firms' strategies and performance. Using our proposed model, we analyze e-government and institutional voids as critical variables for firm formalization.

- E-government

The positive effect of e-government on business formalization stems from the fact that it facilitates the registration of new businesses and the digitization of taxes. Moreover, Kim & Lee (2019), in a study of small and medium-sized enterprises in emerging economies, argue that e-government positively impacts formalization, as it generates greater transparency and efficiency in government services and improves trust between entrepreneurs and government. Klapper et al. (2019) argue that digital adoption reduces transaction costs, indicating a benefit of formalization. However, on occasion e- government can have a negative effect by causing an increase in control and regulation over formal businesses, which can incentivize a return to informality (Reece, 2006). Therefore, we propose the following hypothesis for evaluation:

H1: E-government has a positive and significant impact on business formalization.

- Formal institutional voids

Institutional voids refer to the lack of intermediaries such as financial services and quality certification companies, which limits economic growth and development. In this study, we emphasize how institutional voids are reflected in the public bureaucracy, in specific terms of the administrative procedures that entrepreneurs must complete before government institutions can be considered formal enterprises. In this regard, bureaucracy can be a barrier to formalization (Perry et al., 2007). Excessive administrative red tape and high taxes often induce companies to join the informal economy (Silupu et al., 2022) as a form of rejection of the overcoats in terms of time, money, and information access involved in complying with all formalization requirements (Ulyssea, 2020). Therefore, we propose the following hypothesis:

H2: Institutional voids (specifically bureaucracy) have a negative and significant impact on business formalization.

6.2.2. Industry-based perspective

The industry-based perspective places importance on industry structure and environment, and how they determine firm behavior (Gao et al., 2010; Porter, 1980). In this vein, our study proposes entrepreneurial cooperation within an ecosystem of entrepreneurial environments as a determinant of entrepreneurial formalization.

- Business cooperation

Business cooperation is defined as the synergy of ideas and resources between companies to maximize competitiveness and innovation to increase business performance (Beamish & Lupton, 2016). The benefits of cooperation are: increase in human capital, development of new products and processes (Najib & Kiminami, 2011). In the formalization aspect, the literature argues that the need to create a favorable business environment is fundamental for business formalization (Zylfijaj, Nikoloski & Tournois, 2020), due to the fact that this business environment generates that companies obtain access to financing. However, an unstable environment such as corruption, excessive regulation and lack of trust are some of the variables that hinder formalization (Hafner-Burton & Schneider, 2019). Therefore, we propose the following hypothesis to be evaluated.

H3: Business cooperation has a positive and significant impact on business formalization.

6.2.3. Resource and capability-based perspective

The resource-based view holds that firms' resources and capabilities enable them to gain a competitive advantage (Barney, 2001). Likewise, capabilities are the tools that firms use to create value through innovation and to achieve competitive advantage (Widya- Hasuti et al., 2018). Our study proposes the variables of productivity, motivation, and digital transformation as determinants of the resource- and capability-based perspective that affect business formalization.

- Business productivity

Those businesses that present informal activities are characterized by presenting low productivity with little or no value added (Kambur, 2017). In this sense, Gajigo and Hallward-Driemeier (2012) find that higher productivity increases the probability of firms formalizing or remaining in the formal sector because these firms obtain higher revenues and gain the ability to operate formally. Higher productivity often entails operational efficiencies and more effective management of resources, allowing the firm to improve its profitability and competitiveness. By being in a stronger position financially, the company may have the

ability to meet the formal and regulatory requirements necessary for formalization.

The relationship between business productivity and formalization has been extensively studied over the last few years (Rand & Torm, 2012; Loayza, 2018; Lay & Tafese, 2020; Roy & Khan, 2021), highlighting the importance of business formalization. This leads us to the next hypothesis:

H4: Business productivity has a positive and significant impact on business' formalization.

- Motivation to grow

The growth of companies is considered an essential factor for business (Davidsson, 1989). Company motivation refers to the search for motives to inspire specific objectives related to the desired ends (Kirkwood, 2009). Motivation that pushes companies to grow allows for improved profitability and an increased number of workers (Edelman et al., 2010). The literature attests to the importance of motivation in business formalization (Olomi et al., 2011). However, motivation to grow can be considered a spontaneous factor that must be aligned with a favorable environment, government support, and benefits for the entrepreneur. Taken together, all these attributes increase the probability of a business formalizing and accessing opportunities in the market. Therefore, we propose the following hypothesis:

H5: Motivation to grow has a positive and significant impact on business formalization.

- Digital transformation

As noted in Section 4.3, digital transformation is a strategic and comprehensive process in which organizations incorporate digital technologies to improve and transform their operations, business models, and internal and external experiences. This change goes beyond the mere adoption of technological tools; it entails a cultural, organizational, and operational transformation, capitalizing on digital opportunities to foster innovation, optimize decision-making, and add value for customers and other stakeholders.

– Digital transformation and business productivity

Several studies have investigated the effect of digital transformation on productivity from a business perspective (Du and Jiang, 2022; Li & Tian, 2023), verifying the positive impact of digital transformation on productivity (Galio et al., 2022). While early studies demonstrated the relationship between information technology, data analytics, and software on productivity, studies still need to be improved when linking the relationship between digital transformation and productivity. Digital transformation is understood as an enterprise-wide change that drives new business models. Du & Jian (2022) argue that firms' digital

transformation can help boost productivity. This relationship is also relevant to the objective of our study, since when productivity is related to the adoption of more advanced technologies and management practices, it facilitates the implementation of formal accounting, invoicing, and reporting systems. This leaves companies better equipped to deal with the administrative complexities associated with formalization, such as tax and labor compliance. Therefore, we propose verification of the following hypothesis.

H6: digital transformation has a positive and significant impact on business productivity.

– Digital transformation and entrepreneurial motivation

Digital transformation substantially impacts entrepreneurial motivation by improving operational efficiency, fostering adaptability, creating new business opportunities, and increasing competitiveness. This internal cultural change strengthens the pursuit of business growth and drives companies toward greater formalization. Studies support this assertion; for example, Zhang et al., (2021) demonstrate that digital transformation improves organizational resilience. Agustian et al., (2023) illustrates how digital transformation enables a change in business models. Adamik and Nowicki (2018) discuss the positive impact of digital transformation on competitiveness through digital empowerment. Perkin and Abraham (2021) explore the crucial role of digital transformation on organizational experience and culture, optimizing efficiency and propelling business growth. Therefore, we propose the following hypothesis:

H7: digital transformation has a positive and significant impact on the motivation of entrepreneurs.

– Digital transformation and business collaboration

Digital transformation is emerging as an enabler of collaborative innovation and improved efficiency in interactions with stakeholders, such as suppliers, partners, and competitors. A study conducted by Abdalla and Nakagawa (2021) highlights the positive and significant impact digital transformation exerts in optimizing efficiency in business collaboration. Furthermore, according to Peng and Tao (2022), digital transformation fosters greater coordination and cooperation among firms when it comes to collaborating on innovation or engendering a facilitating effect that boosts partnerships and business competitiveness. Therefore, we propose the following hypothesis:

H8: Digital transformation has a positive and significant impact on business collaboration.

– Digital transformation and e-government

Digital business transformation is one of the main drivers of public digitization, acting as an external pressure to digitize public services (Mergel et al., 2019). Moreover, the digital transformation of businesses can significantly enhance the impact of e-government on formalization by influencing the way organizations interact with government institutions and vice versa (Luna-Reyes & Gil-Garcia, 2014). Processes such as reporting, paying taxes, and participating in tenders can be simplified and optimized through digital platforms. Thus, digitally transformed companies can collaborate more effectively in government initiatives. The relationship between digital transformation and digital government is also relevant for formalization, as it enables more accurate and detailed information exchange between businesses and government institutions, contributing to greater transparency in regulatory, commercial, and environmental matters, as well as opening up general communication channels that facilitate meeting the needs of businesses and citizens as a whole (Williams, 2023). This prompts the next hypothesis:

H9: digital transformation has a positive and significant impact on e-government.

– Digital transformation and formal institutional voids

In this study, we emphasize how institutional voids can be reflected in the public bureaucracy and how this problem can be addressed through digital transformation and the use of applications and the internet in particular. Beyond bureaucracy, which will be studied in the quantitative model, digital transformation also helps to reduce other institutional voids by aiding identification and offering detailed information on markets, thus diminishing the risk of adverse selection. In this regard, digital platforms have played a crucial role in filling these institutional voids, improving processes, and increasing efficiency. In addition, they promote greater financial inclusion, benefiting firms with more limited capabilities rather than solely favoring large firms. Therefore, we propose the following hypothesis:

H10: digital transformation has a positive and significant impact on reducing formal institutional voids.

– Digital transformation and business formalization

The intensification of technology and digitalization transformed the traditional way of working (Chacaltana et al., 2018) and catalyzed innovative and disruptive business models (Heredia et al., 2022). Pivotal to this process are digital platforms (email, virtual meetings, social media), which are an essential means for companies to develop their business networks, facilitating digital services more innovatively (Khattak et al., 2022). Similarly,

digital transformation is an essential factor in the formalization process, and its influence will depend on the degree of innovation that the company has. In this sense, technology companies that need to innovate and protect their innovations have a greater incentive to formalize. By contrast, those with slower growth and less need for innovation may not do so and remain informal (Bu & Cuervo-Cazurra, 2004). Digital transformation is a therefore a coherent means of business formalization, prompting the following hypothesis:

H11: digital transformation has a positive and significant impact on business formalization.

6.3. Methodological design: mixed approach

In this section, we address the methodology employed in the study: a mixed approach that integrates the quantitative and qualitative data which iteratively inform each other throughout the research process. After applying this technique, we analyzed the results and supported them during the interpretation phase. The entire process enables a comprehensive and in-depth analysis of the research scope.

First, we conducted a quantitative estimation to identify the determinants influencing the formalization process of businesses. To achieve this, we surveyed 603 entrepreneurs from APEC economies. We also employed a qualitative methodology based on 11 semi- structured interviews, allowing us to gather information about non-quantifiable factors that influence the formalization process. This qualitative approach contributed significantly to expanding the conclusions drawn from the quantitative methodology.

7. Quantitative component: partial least-squares structural equation model

We obtained the data via surveys administered to entrepreneurs from several APEC economies between July and September 2023. We employed the SurveyMonkey platform (premium version) and used various strategies to increase the response rate. These included resending emails every four days, personalized invitations that were accessible and attractive to companies and friendly reminders. We obtained a sample of 603 data points from the owners of small and medium-sized private companies that participated in the survey. The economies included in the sample are Brunei Darussalam; Canada; Chile; China; Hong Kong, China; Indonesia; Japan; Korea; Malaysia: Mexico; New Zealand; Papua New Guinea; Peru; the Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States and Viet Nam. The research focuses on a large group of economies so that we could maximize our understanding of the phenomenon of interest. We also sought to detect similarities and differences between the economies of Peru and the Philippines: two economies that have experienced remarkable economic growth in recent decades and have

an extensive trade relationship. More specifically, the comparative study between Peru and the Philippines allowed us to identify similarities and differences in terms of the government policies, strategies, and factors driving business formalization.

Peru and the Philippines offer intriguing opportunities for analysis and comparison given their parallel growth patterns in recent years. These economies share similar levels of innovation and competitiveness; however, their distinctive institutional characteristics provide a basis for a meaningful and enriching comparative study.

Rocha (2021) argues that it is necessary to consider a set of economies to understand heterogeneous effects. However, missing data, comprising up to 50% of all values, were excluded from the comparative study.

7.1. Variables selection

The present study considered internal factors (productivity, motivation, and digital transformation) and external factors (e-government, institutional voids, and cooperation) relevant to understanding business formalization. The dependent variable in the model was business formalization. The explanatory variables included productivity, digital transformation, e-government, institutional voids, and cooperation. It is worth noting that all variables were constructed and shaped by a series of indicators derived from survey questions, as shown in Table 3, in the Appendices.

7.2. Measures of variables

The measures used for each study variable were based on the Likert scale. The constructs employed were formalization, digital transformation, productivity, motivation, e-government, business cooperation, and formal institutional voids.

All constructs were measured as composites mode A (Henseler and Schuberth, 2020). We employed the standard method for assessing information quality, which could enhance relationships between variables when collected from the same source. The analysis using the Harman single-factor test (Mendy et al., 2019) did not reveal that the variables were clustered into a single factor, indicating no issues (Twigg, Kutzer, Jacob & Seaman, 2019).

We included the following control variables to eliminate the potential endogeneity bias from omitted variables: company age and gender (percentage of your business’s management team is comprised of women). Company age was constructed as the difference between the survey year (2023) and the start of the company's operations, and the gender variable is a Likert-type variable described in Table 3.

7.3. Data analysis

We tested our research model using Partial Least Squares (PLS) through RStudio software. We chose RStudio for the following reasons: (i) flexibility and unlimited data capacity, (ii) ease of replicating results using open-source code, (iii) continuous updates, and (iv) the availability of a specific book, Partial Least Squares Structural Equation Modelling (PLS-SEM) Using R" by Hair et al., (2022), which covers recent advances in the methodology. The PLS-SEM methodology was applied overusing major steps: (i) model fitting, (ii) bootstrapping (10,000 subsamples), (iii) exact fit tests based on bootstrapping of the estimated model, and (iv) assessment of coefficients, significance, and the coefficient of determination (R2).

7.4. Preliminary results

In this section, we explain the empirical results based on three models: (i) the General Model, covering 603 data points from all APEC economies; (ii) the Peru Model, with 452 data points, and (iii) the Philippines Model, with 103 data points.

Using the structural model, we examined the collected data. We assessed the reliability of the coefficients through the Cronbach's alpha coefficient and employed the composite reliability analysis to evaluate the associations between latent variables for the model. The results show that all variables had a substantively positive relationship with each other.

7.4.1. General Model

The indicator loadings for each construct were generally above 0.707. All variables, except for the e-government variable with a rhoC value of 0.655 and an alpha of 0.651, are slightly below the threshold. For the other model variables, the composite reliability of the constructs was above 0.707, and they obtained an AVE[9] above 0.5. In addition, the alpha[10], rhoA, and rhoC[11] values for Cronbach's alpha were above the limit. For more details, see Table 4.

[9] AVE (Average Variance Extracted) is a measure that indicates how much variance the items of a scale share in relation to the variance due to measurement error. Generally, values greater than or equal to 0.5 suggest that the scale items indicate good scale convergence.

[10] Cronbach's Alpha is a measure of the internal consistency of a set of questions or items (a survey, in our study) that form a scale. It indicates how closely related the questions are to each other. A high Cronbach's alpha value (close to 1) shows that the questions in the scale are strongly related, which means that the scale is reliable.

[11] The rhoA and rhoC measures are alternative reliability measures to Cronbach's alpha that allow multidimensional data modeling.

Table 4. Reliability and validity of the general model

Variables	**Alpha**	**rhoC**	**AVE**	**rhoA**
Digital Transformation (DT)	0.920	0.934	0.641	0.924
E-government (G)	0.651	0.810	0.588	0.655
Productivity (P)	0.805	0.911	0.837	0.807
Formal institutional voids (V)	0.903	0.955	0.877	0.942
Motivation to grow (M)	0.873	0.909	0.668	0.884
Business cooperation (C)	0.801	0.882	0.714	0.806
Formalization (F)	0.783	0.902	0.822	0.785
Control 1	1.00	1.00	1.00	1.00
Control 2	1.00	1.00	1.00	1.00

We also assessed discriminant validity in accordance with the Fornell-Larcker criterion (Fornell & Larcker, 1981). Each measure had a square root of AVE greater than the correlation with the other latent variables, which meant that the acceptable discriminant validity threshold was also met, as the results for the final or column of each construct did not exceed the diagonal value. For more details, see Table 5.

Table 5. Fornell-Larcker Criterion (Discriminant Validity) – Global Model

	TD	G	P	V	M	C	F
TD	**0.786**						
G	0.154	**0.770**					
P	0.176	0.182	**0.914**				
V	0.197	0.250	0.099	**0.933**			
M	0.386	0.288	0.352	0.294	**0.816**		
C	0.334	0.306	0.191	0.327	0.459	**0.832**	
F	0.110	0.231	0.217	0.042	0.257	0.187	**0.899**

TD=digital transformation; G=e-government; P=business productivity;
V=institutional voids; M=motivation to grow; C=business cooperation;
F=formalization.

In addition, we conducted the heterotrait-monotrait (HTMT) test (Henseler, Ringle, & Sarstedt, 2016) of correlation ratio to examine validity. Henseler et al. (2016) propose that the maximum allowable value for HTMT should be 0.85. As shown in Table 6, the values of our model fully met the suggested validity criteria.

Table 6: Heterotrait-Monotrait correlation ratio (HTMT) – Global Model

	TD	G	P	V	M	C	F
TD							
G	0.156						
P	0.251	0.230					
V	0.285	0.219	0.094				
M	0.416	0.290	0.413	0.345			
C	0.413	0.330	0.225	0.426	0.536		
F	0.119	0.327	0.293	0.018	0.286	0.209	

TD=digital transformation; G=e-government; P=business productivity; V=institutional voids; M=motivation to grow; C=business cooperation; F=formalization.

7.4.2. Empirical models for Peru and the Philippines

For both economies, the indicator loadings for each construct were generally above 0.707. All variables, except for the e-government variable, were slightly below the threshold. For the other variables in the model, the composite reliability of the constructs was above 0.707, with AVE above 0.5; furthermore, the Cronbach's alpha, rhoA, and rhoC values were above the threshold. For further details, refer to Table 7 and Table 8.

Table 7. Reliability and validity of the Peru model

Variables	**Alpha**	**rhoC**	**AVE**	**rhoA**
Digital Transformation (DT)	0.912	0.928	0.619	0.916
E-government (G)	0.659	0.805	0.581	0.696
Productivity (P)	0.802	0.910	0.835	0.802
Formal institutional voids (V)	0.926	0.953	0.870	0.963
Motivation to grow (M)	0.871	0.926	0.715	0.905
Business cooperation (C)	0.779	0.871	0.692	0.784

Formalization (F)	0.763	0.894	0.809	0.764
Control 1	1.00	1.00	1.00	1.00
Control 2	1.00	1.00	1.00	1.00

Table 8. Reliability and validity of the Philippines model

Variables	**Alpha**	**rhoC**	**AVE**	**rhoA**
Digital Transformation (DT)	0.920	0.934	0.641	0.924
E-government (G)	0.659	0.805	0.581	0.696
Productivity (P)	0.831	0.922	0.855	0.832
Formal institutional voids (V)	0.922	0.950	0.865	0.932
Motivation to grow (M)	0.899	0.926	0.715	0.905
Business cooperation (C)	0.884	0.924	0.802	0.977
Formalization (F)	0.783	0.902	0.822	0.785
Control 1	1.00	1.00	1.00	1.00
Control 2	1.00	1.00	1.00	1.00

We evaluated discriminant validity based on the Fornell-Larcker criterion (Fornell & Larcker, 1981); each measure has square roots of AVE greater than its correlation with the other latent variables, meeting the acceptable discriminant validity threshold. For more details, see Table 9 and Table 10.

Table 9: Fornell–Larcker Criterion (Discriminant Validity) – Peru

	TD	G	P	V	M	C	F
TD	**0.786**						
G	0.154	**0.770**					
P	0.176	0.182	**0.914**				
V	0.197	0.250	0.099	**0.933**			
M	0.386	0.288	0.352	0.294	**0.816**		
C	0.334	0.306	0.191	0.327	0.459	**0.832**	
F	0.110	0.231	0.217	0.042	0.257	0.187	**0.899**

TD=digital transformation; G=e-government; P=business productivity; V=institutional voids; M=motivation to grow; C=business cooperation; F=formalization.

Table 10: Fornell-Larcker Criterion (Discriminant Validity) – Philippines

	TD	G	P	V	M	C	F
TD	**0.799**						
G	0.167	**0.762**					
P	0.476	0.017	**0.925**				
V	0.397	0.063	0.099	**0.930**			
M	0.396	0.065	0.352	0.385	**0.846**		
C	0.351	0.179	0.191	0.437	0.374	**0.896**	
F	0.238	0.129	0.217	-0.091	0.204	0.181	**0.929**

TD=digital transformation; G=e-government; P=business productivity; V=institutional voids; M=motivation to grow; C=business cooperation; F=formalization.

Furthermore, we also performed the HTMT test (Henseler, Ringle, Sarstedt, 2016) to examine the validity of the correlation relationship. As noted above, Henseler et al., (2016) suggest that the maximum allowable value for HTMT be 0.85. As can be seen in Table 11 and Table 12, the values in our model fully meet the suggested validity criteria.

Table 11. Heterotrait-Monotrait (HTMT) Correlation Ratio – Peru

	TD	G	P	V	M	C	F
TD							
G	0.191						
P	0.196	0.240					
V	0.210	0.319	0.116				
M	0.413	0.368	0.427	0.328			
C	0.393	0.426	0.239	0.382	0.555		
F	0.125	0.321	0.277	0.047	0.319	0.237	

TD=digital transformation; G=e-government; P=business productivity; V=institutional voids; M=motivation to grow; C=business cooperation; F=formalization.

Table 12. Heterotrait-Monotrait correlation ratio (HTMT) – Philippines

	TD	G	P	V	M	C	F
TD							
G	0.182						
P	0.514	0.092					
V	0.433	0.174	0.141				
M	0.408	0.122	0.429	0.417			
C	0.366	0.202	0.208	0.493	0.418		
F	0.249	0.183	0.338	0.107	0.230	0.181	

TD=digital transformation; G=e-government; P=business productivity; V=institutional voids; M=motivation to grow; C=business cooperation; F=formalization.

Structural Model

In line with Hair, Sarstedt, Ringle, and Gudergan (2017), to assess the statistical significance of path coefficients we used bootstrapping (10,000 resamples) to generate t- statistics along with confidence intervals. Table 10 displays the results of this model. In addition, the structural model was evaluated by way of total variance or R2, the p-value, t-statistic, and beta.

Overall, as shown in Table 13, direct effects were mostly significant; only the relationships (digital transformation -> formalization and business cooperation -> formalization) were not significant, while the other nine variables were significant. Moreover, the path analysis showed that of the control variables (owner's gender and company age), only age significantly affects the model.

Likewise, as shown in Table 13, the results for Peru indicate that all relationships are significant except for (digital transformation -> formalization), (institutional voids -> formalization), and (business cooperation -> formalization). Thus, our results show that for Peru, digital transformation contributes to business formalization but only through increased productivity and by leveraging e-government. The motivation to grow is also important for formalization: formalizing for growth promotes understanding of all the opportunities

available to a business. This growth drive requires clear objectives, the setting of goals, and greater knowledge of rights. Further, formal institutional voids do not hinder or otherwise impact or formalize; this can be attributed to the various factors explaining formalization, such as regulatory burdens or widespread informality. Finally, it is worth stressing the government's efforts in recent years to digitize as well as the benefits yielded by business formalization (Williams, 2023).

For the Philippines, the results show that all relationships are significant except for (digital transformation -> e-government) and (digital transformation -> formalization). The relationship (productivity -> formalization) is not significant. This result may be explained by each economy's specific context, as identified by Leal & Chacón (2017). Regardless of productivity, businesses may obtain significant benefits using other alternatives, such as increasing business training. In this regard, the Philippines has low levels of competitiveness, according to the Business Competitiveness Index, and there is also an indication of the need for structural reforms.

The following relationships were not significant: (motivation to grow -> formalization), (business cooperation -> formalization), (e-government -> formalization).

In general, for both economies, we observe the importance of digital transformation on productivity, motivation to grow, business cooperation, e-government, and formal institutional voids. We also find that digital transformation does not have a direct impact on formalization in any model. However, it is crucial to stress the importance of digital connectivity in the context of digital transformation and business formalization. In the case of Peru and the Philippines, a significant difference is observed in the relationship between digital transformation and connectivity. Our results show that for the Philippines, (digital transformation -> digital connectivity) is not significant; this can be explained by the E-Government Development Index (EGDI) for 2022, in which the Philippines lags behind other APEC economies for digital connectivity, attesting to the challenges it faces in this regard.

Table 13. Model results

		Global model			**Peru model**			**The Philippines model**		
Hypothesis	Paths	Path coefficient	t value	Significance	Path coefficient	t value	Significance	Path coefficient	t value	Significance
H1	E-government -> Formalization	0.170(***)	4.016	Si	0.159(***)	2.832	Si	0.078	0.683	No
H2	Formal institutional voids -> Formalization	-0.092(*)	-1.946	Si	-0-073	-1.417	No	-0.331(***)	-2.662	Si
H3	Business cooperation -> formalization	0.065	1.310	No	0.051	0.916	No	0.092	0.736	No
H4	Productivity -> Formalization	0.114(***)	3.300	Si	0.100(***)	2.277	Si	0.086	0.783	No
H5	Motivation to grow -> Formalization	0.124(***)	2.398	Si	0.162(***)	2.759	Si	0.066	0.546	No
H6	Digital transformation -> Productivity	0.227(***)	5.499	Si	0.176(***)	3.716	Si	0.476(***)	5.388	Si
H7	Digital transformation -> Motivation to grow	0.387(***)	11.456	Si	0.386(***)	10.685	Si	0.396(***)	4.560	Si
H8	Digital transformation -> Business cooperation	0.357(***)	9.619	Si	0.334(***)	8.098	Si	0.350	3.962	Si
H9	Digital transformation -> E-government	0.113(***)	2.521	Si	0.154(***)	3.490	Si	0.167	1.211	No

H10	Digital transformation -> Formal institutional voids	0.264	6.604 (***)	Si	0.197(***)	4.511	Si	0.397(***)	3.938	Si
H11	Digital transformation -> Formalization	0.027	0.584	No	0.032	0.617	No	0.196	1.451	No
	Control 1 (gender) -> Formalization	0.015	0.058	No	0.047	0.689	No	0.167	1.530	No
	Control 2 (age) -> Formalization	0.154	4.116(***)	Si	0.148(***)	3.157	Si	0.191(***)	2.025	Si

Level of significance: *(***) p<.01; (**) p<.05; (*) p<0.*

To achieve a better visual understanding of the empirical models conducted, Figure 5 illustrates the significant relationships. Black arrows (→) denote positive and significant relationships for the General model. Additionally, red arrows (→) indicate positive and significant relationships for the Peru model, while the teal arrow (→) represents positive and significant relationships for the Philippines model. Meanwhile, dashed arrows (--->) signify negative and significant relationships, and relationships that are not connected indicate insignificance.

8. In-depth analysis: qualitative method

To complement the proposed quantitative analysis model for the conducted surveys, we also gathered the opinions of various experts and stakeholders in the digitization and formalization process from APEC economies; eleven personal interviews were conducted with experts representing academia, the business sector, and international or multilateral organizations working with APEC member economies. The selection of this diverse range of interviewees was based on their involvement in researching the informality issue, their role in the market as decision-makers promoting formality, or their efforts to drive development. The study also incorporates the opinions of numerous entrepreneurs by way of the surveys they completed and the insights expressed at an APEC event regarding the situation of informality in member economies.

The qualitative analysis of the interviews is intended to deepen understanding of the different mechanisms through which an economy can enhance and expedite its formalization process. Similar to the quantitative section of the study, the objective is to determine the impact of the digitization process on formalization levels in APEC economies. The interviews (lasting between 40 and 60 minutes) were conducted virtually in 2023, and the interviewees' information will remain anonymous. We applied thematic to the interviews and qualitative information, using the interview guide (see Annex 14) to establish analysis categories. This facilitated the segmentation of the analysis into sections and the encoding of interview content.

After the transcription of the interviews, the processing involved coding responses related to the research objective. The same sections utilized in the interview guide were used to generate labels (see Appendix 15). In addition, where necessary, we created new labels related to any topics that emerged during the interviews but were still relevant to the research topic. We employed the ATLAS.ti software package, which allows for the analysis of substantial volumes of qualitative

information, to process the opinions ventured in the interviews.

The analysis comprises four sections consistent with the theoretical framework of the strategic tripod analysis described in Section 6.2: a) the role of entrepreneurial capabilities in formalization, b) the role of institutions, c) the role of industry, and d) the relationship between digitization and formalization. Because this study seeks to identify the role of digitization, the last section discusses its importance. Given the characteristics of the interviewees and the predominant response from Peruvian entrepreneurs in the survey, analysis of the Peruvian case is given special attention in each section. Thus, the study aims to establish common themes and opinions to understand the consensus regarding the role of digitization along with other factors in the formalization process.

8.1. Preliminary Results

8.1.1. The role of companies: productivity, motivation and innovation

Most of the interviewees agree that one of the main, if not the most important, factors in the formalization process is the increase in companies' productivity. As companies grow, the need for formalization becomes greater, as is evident in the proportion of formal companies with a higher number of employees. Formalization allows these companies to improve various processes related to information and administration management, thereby increasing productivity. In addition, digitization plays a crucial role in enhancing productivity, as the adoption of new technologies leads to improved company productivity.

> “Something important for the formalization of the company is the fact that the company is growing, having a company that is growing, that needs to continue growing and needs to formalize in this process of company growth. Digitization is also essential to gain competitiveness, have effective information systems, and have processes that ultimately make you more productive." - Researcher, Mexico.

However, companies must do more than just increase their productivity; the formalization process must offer clear benefits that motivate enterprises in the informal sector to transition to formality. To expand their formal sectors, economies must understand that companies must be given clear incentives to leave informality. These incentives may vary but can include cost reductions in formalization, more straightforward official registration processes, and tax benefits for formal businesses. Yet in developing economies the majority of businesses do not perceive sufficient

encouragement to formalize. The role of gender in formalization is also crucial since, culturally, women are more inclined to formally engage in entrepreneurship and tend to act more responsibly when it comes to compliance with regulations. Digitalization can contribute to greater motivation for businesses to formalize if digital tools are utilized to achieve the aforementioned incentives.

> "In many places, people that pay taxes prefer to be on the payroll and implement formal practices, because they see that they could have an advantage by being formal. So those are things that we need to consider. So being formal could help with many things. It could help to get, for example, credit, to expand a business, and so on and so forth. But we really need to look at the reasons that are motivating actors to stay informal. If we don't do that, I mean, there's not going to be a solution." – Expert from a multilateral organization.

The impact of digital transformation on productivity occurs primarily through two dimensions: the improvement in company productivity and increased worker productivity. As noted earlier, companies enhance their production processes through the adoption of new technologies. On the other hand, workers must be trained or must receive training to fully leverage digital tools, which will lead to an increase in each worker's productivity. Some technology service providers have already recognized the potential of worker training and offer direct classes to workers or utilize digital platforms to instruct workers in the use of their digital tools free of charge.

> "I think digitalization definitely requires quite a lot of training of the workforce. And this are extremely important for the labor force to understand, to be better equipped to know how to use different kinds of resources." – Expert from a multilateral organization.

Finally, it was mentioned that digitization impacts other dimensions of businesses, such as the motivation to innovate and innovation itself. The digital transformation that most companies undergo is aimed at improving production processes and enhancing business strategies, especially for smaller companies and those in the manufacturing sector. In addition to increasing productivity, companies use new digital tools to modernize and devise new processes that make them more efficient. Currently, digital transformation is present in almost all innovation processes, but this does not guarantee that innovation drives the formalization of businesses. Innovation enhances the performance of companies by creating or improving their processes, but without the proper incentives, companies will remain in the informal sector.

> "The most important technological or digital process that helped our organization is the

> use of social media for our digital marketing, and the smart/cloud tools such as Google Drive and Forms for our operations. AI has also helped us to create/edit content faster and efficiently." – Entrepreneur, the Philippines.

From the standpoint of businesses, the formalization process depends on productivity, motivation, and incentives. The interviewees agree that these factors drive companies to formalize, and the process of digitization can play a significant role by positively impacting them; that is, it influences motivation through incentives, which will be analyzed in the section on institutions). In addition, the interviews cite entrepreneurial innovation as another aspect that digitization encourages. However, these processes do not necessarily lead to formalization.

The Peruvian Case

The dynamics between digitization and formalization in Peru are quite similar to those in other APEC economies. First, we find that business productivity and motivation have a positive impact on the transition to formality. Some interviewees noted that owners of small and medium-sized enterprises in Peru are given very few incentives to formalize, and that this reduces their willingness to do so (insofar as they consider remaining in the informal sector to be more beneficial). Accordingly, in Peru informal businesses are found to be very unproductive and to have no real motivation to formalize.

> "I mean, it's very important to reduce the cost, I mean, of formalization. And also, it's very important that different actors see the benefits of formalization. So, if they don't see the benefits, they will never formalize. So many of them say, oh, if we become formal, we may get less income, for example, or we have to pay taxes, and then we don't reap the benefits of paying taxes because the provision of public services is not the best. And so that's the problem." – Expert from a multilateral organization.

Second, we were able to delve into the role of digitization and found that its impact on productivity can be significant, but more so for formal sector companies since they have more resources and greater capacity to innovate. This innovation occurs heterogeneously across formal and informal and small and large enterprises. But even if there is innovation in the informal sector, it does not necessarily translate into increased formalization since Peruvian companies may innovate to increase their profits. However, as we have seen, if the benefits of formalization are not evident, companies will remain in the informal sector.

> "Digitization increases the productivity of both groups, but it seems to me that, due to the scale of formal companies, digitization has greater potential. Not the same type of digitization, but the use of cutting-edge technologies is at their disposal. The competitive pressure from the informal sector seems to encourage innovation in the formal sector" – Expert from a multilateral organization.

Finally, in the Peruvian case, the interviewees note that companies may encounter barriers that prevent them from reaping the benefits of digitization. For example, even if a company undergoes digital transformation and innovates in its process, there are still many parts of the economy that lack adequate internet access. Another example of a digital barrier is the low technological knowledge of users (customers and entrepreneurs), which, in the case of larger enterprises, can limit the adoption of new digital tools. These are among the incentives for companies to digitize, and in economies like Peru they are less apparent.

> "Well, it's a fantastic idea, but the problem is can I do with my small store in a village without connectivity nestled in the Andes? We always talk about digitization as a solution to the problem, but we don't understand that there are previous stages that have to be done to create this digitization process. And one of the previous stages of the digitization process is connectivity." – Business owner, Peru.

The Role of Institutions: e-government and formal institutional voids

In this section we analyze the role of the government or institutions overall in the formalization processes generated by digitization. Around the world, most economies are going through a comprehensive digital transformation process and recognize the benefits of digitization as a tool to combat the problem of informality. Thus, we noted two important mechanisms whose effect is significant: increasing incentives for formalization and optimizing member economies´ supervisory capacity.

First, the digitization process is viewed in the context of e-government, which governments adopt to improve the provision of their services or optimize their administrative functions through new technologies. The interviewees agree that e- government allows domestic administrations to get much closer and collect much more information from companies and workers in general. This can incentivize companies to formalize and allows for better supervision of those that do not want to.

> “Economies have a lot of information; sometimes they don't share it with each other. This issue of digitization, for that same reason, has great potential for very strong control. It also has it for service, as we have said, to expand the coverage of what a government administration can do.”– Expert from a multilateral organization.

Second, current formalization policies take into account the practicability of new digital tools. Even if a government does not fully subscribe, the market is inevitably subject to digital transformation trends that domestic administration need to follow. The interviewees noted experiences, even in APEC’s developed economies, in which domestic administration did not take full advantage of digitization, which meant that the performance of companies was less efficient because they had to work with a counterpart that was not fully digitized. Therefore, in time, the global trend of digital transformation will push all governments to adopt new technologies that contribute to development in all aspects.

> “I think digitization is a trend. Whether the government likes it or not, it's here to stay. And no matter what kind of policy they roll out, it's probably going to push it into certain directions, right? I wouldn't say that I've seen anything that's, like, a complete failure. But I have seen a lot of obstacles in terms of the legal infrastructure that is not adequate to support a digital economy.” – Expert from a multilateral organization.

On the one hand, with the adoption of new technologies, governments´ capacity for supervision and observation (also known as enforcement) increases. Tax authorities make efforts to reduce informality, especially in developing economies where tax collection is low. Greater enforcement has a direct impact on promoting formalization for all types of businesses, and technological tools contribute to this.

> “The only thing I would say is that you can give focus or the possibilities of taking advantage of digitization for formalization. For me, it should not be the formalization strategy but an element, a component of the formalization strategy. Now, I do believe that digitization can help. Why? One, in many cases, digitization leaves a trail, a trace of transactions” – Expert from a multilateral organization.

Thus, digital transformation provides many tools for supervision, primarily because it allows them to review companies' information regarding the number of workers, salary compliance, and labor and tax obligations. With the adoption of digital tools, it becomes easier to identify which companies do

not comply with their duties in order to sanction them accordingly.

> "With technological advances, one can analyze large amounts of information. For example, relatively basic things like 'Hey, why you are paying taxes but we don't see you in the pension plan?' Before, they used to say it's millions of data, but now almost your phone would do it; I mean, processing millions of data is no big deal anymore. But not only that, something like, "Hey, you're spending a lot on electricity for a company without employees." – Expert from a multilateral organization.

> "I always beat the deadline in paying my taxes. With the coming of fintech (G-Cash), I managed to pay my taxes on time without leaving the confines of my home. I have worked from since pre-pandemic times. And since my business model is hinged on digital, I have always relied on the latest digital transformation tools and trends in making business strategic decisions and in communicating with my clients. All my business offerings relied heavily on new digital tools which fortunately came for free but were able to deliver on my needs."– Business owner, the Philippines.

Digitization also improves the governments´ capabilities to approach companies, facilitate the formalization process (mainly in cost and time reduction), and inform them about the benefits of belonging to the formal sector. E-government allows the government to handle large volumes of data from companies and to recognize their needs. Thit not only contributes to formalization but also allows governments to observe specific needs that digitization can help companies meet in order to close these gaps.

> "Governments must act and address the issue based on the size of the targeted business. For example, governments should provide funding assistance towards the purchase of new software for micro and small businesses. But for larger businesses, the government should impose regulations and standards that would push businesses to adopt new tools and technologies to meet those new rules." – Business owner, Australia.

> "And also the use of smartphones to open an invoice; smartphones also to consult tax obligations. Not all administrations, especially during the pandemic, did very much to encourage digital usage for compliance with tax obligations, tax consultations, so today it is very easy. But as I was saying, there is still a representative number of people,

individuals, who remain informal." – Expert from a multilateral organization.

Finally, although both mechanisms are mentioned, most opinions highlight the greater importance of enforcement in increasing formalization. In developing economies, informality levels are quite high and it is necessary to combat this problem by attracting informal businesses to the formal sector, but it is even more important to control those that, despite being large in size or having been in operation for many years, do not wish to transition.

The Peruvian Case

In Peru, similar trends are observed regarding the role of government institutions in the relationship between digitization and formalization. Similarly, we found that the two mechanisms by which formalization is boosted are an increase in motivation to formalize by making transition to the formal sector more attractive, and improvement in government enforcement to supervise companies. However, interviewees mention that another mechanism could exist within the drive to improve the attractiveness of the formal sector. In addition to facilitating the formalization process, in Peru and other developed economies, digital transformation can be leveraged to improve the provision of public services related to compliance with business regulations.

> "The services that domestic administration can provide, such as firm registration and tax payment, if done digitally, are easier to comply with. So, digitization or the adoption of digital methods for public services aimed at complying with the regulatory framework is a way to make formality more attractive." – Expert from a multilateral organization.

As to the improvements that digitization may bring, the two aforementioned mechanisms are cited by interviews in all economies, and so too is the notion of improvement in public services through digital tools.

8.1.2. The Role of Industry - Business Environment and Cooperation

Throughout the interviews, we sought to identify the role that the industries in which the companies are active played in their level of formalization in terms of digitalization. However, we observed no consensus on this issue; both digitalization and formalization appear to depend more on the context of each economy than the sector in which a company operates. Some interviewees stressed the importance of certain sectors having a predisposition to digitalization (such as banking), and the use that small service sector businesses could make of digital tools in order to be more efficient. Still,

this is not relevant when it comes to evaluating whether these tools can have a positive effect on formalization.

> "The effects of digitalization should be able to be captured across different industries and sectors. There will be differences in the extent of take-up and level of benefits, but these are likely to materialize in the size of the individual business entities being studied (i.e. small versus large companies). Also, there will be external factors, such as whether any given industry already has existing advanced infrastructure or are subject to stringent government regulations that enforce standards."– Business owner, Australia.

Additionally, the process of digitalization significantly benefits from cooperation between companies and across economic sectors. In interviews, it was emphasized that as well as facilitating the process, technology companies and the banking sector promote digital transformation in other sectors such as services or manufacturing. This is beneficial for the economy, yet no impact on formalization levels was found. Finally, some interviews mention that the propensity to formalize through digitalization would depend in any case on the size of the companies rather than the economic sector.

> "Before then, when telecommunication companies were not in, we never had all these innovations or digital opportunities to capitalize on digital platforms. But now you know, through your smartphone, especially for SME guys, they can be able to get market information or look for market opportunities via the platform." – Researcher, Papua New Guinea.

In this way, it is important to note that digitalization is a cross-cutting and even necessary process for many companies, creating new value chains or improving existing ones between companies from diverse contexts. This increased cooperation results in greater economic activity and improvement in business processes, which could lead to improvements in company-specific aspects and, in turn, an increase in productivity and formalization.

The Peruvian Case

In this developing economy with high levels of informality, the same pattern of cooperation between companies is observed due to cross-cutting digitalization. One successful experience with respect to digitalization is that companies from various sectors use technological tools developed by the

financial sector (mainly digital wallets). Small and medium-sized enterprises benefit considerably from these tools, and digital transformation is observed in all administrative and commercial processes. However, with regard to formalization, the experience has exacerbated the problem. To cite the example of digital wallets, companies gain an advantage by going undetected and conducting transactions outside the formal system. Business digitalization does not have a specific effect on formalization when considering the aspect of cooperation between companies; in reality, in the case of economies with high levels of informality, cooperation through digitalization could even have a negative impact.

> "So, POS [point of sale] is no longer a motivating factor. Because for POS, you receive a card and then you have to recoup the cost of the card. Of course, and the cost of equipment. And definitely a bank account; people have started working with just ID, which lets you have a mobile wallet. So, these processes that were cumbersome before have now been simplified in a simpler way, right? And you have up to 500 dollars to generate transition levels." – Business owner, Peru.

8.1.3. Relationship between Digitalization and Formalization

Now that we have specifically analyzed the three aspects that this study considers important in determining the relationship between digital transformation and the formalization process, we focus on the relationship between these variables and the way in which governments in various economies consider leveraging this relationship to boost their formalization policies.

As we have seen, the digitalization of companies and governments can result in many benefits and a boost to formalization processes at both the business and economy levels. Companies can reap various benefits if they join the digitalization trend and transition to formality simultaneously, just as governments can increase the attractiveness of the formal sector and improve their enforcement capacity. However, it is important that economies have adequate infrastructure and regulations in place; for the relationship to bear fruit, an economy must have suitable levels of connectivity and infrastructure that businesses and citizens can take advantage of. Similarly, it is important that the laws and regulations on digital issues promote investment in digital transformation. The legal systems of each economy must support digital transactions. However, care must be taken to sustain or increase levels of informality if digital transactions are no longer regulated.

> “In terms of the challenges in particularly the developing economies and less developed economies, it's really about the infrastructure. I think that's really key because I remember at the time when we were in Papua New Guinea, it's an economy made of islands. So, it's very difficult to establish an internet tower to connect people. I think having the right kind of infrastructure to support digitization is always the first step. And then the second thing really comes to the regulatory frameworks that's necessary to support digitization. Like when the payments or when e-commerce takes place online, then we have to think about a lot of legal systems that need to be in place to support those kinds of transactions.” – Expert from a multilateral organization.

One of the main benefits of digitalization is the handling and utilization of information for the benefit of the economy. The data collected helps companies better understand their customers and keeps them informed about their own operations so that financial institutions can provide them with access to credit or other benefits. These advantages increase when companies formalize; however, many are not aware of these advantages or still consider the costs of the formalization process to be high and not offset by the benefits.

As noted earlier, digitalization increases company productivity and helps them grow. One group of interviewees stated that the formalization process is a natural outcome once companies become more productive and larger. Thus, the increase in business productivity is the first mechanism by which business formalization increases. Therefore, the goal of digitalization and government policies will be to increase the productivity of companies. Once companies are more productive, what was previously considered disadvantages when formalizing becomes less important because companies can meet the requirements of the formal sector and avoid the risk of being sanctioned.

> “Digitalization makes companies more productive, and by becoming more productive, they approach formality in some way. One could think of it like the minimum wage analogy: when the minimum wage is a problem, it's when it's above the worker's productivity. If the worker's productivity is higher than the minimum wage, the minimum wage doesn't matter. It's the same with informality: when productivity is high enough, regulations and obstacles cease to be so important.” – Expert from a multilateral organization.

> “Formalization of the economy should not be the aim. Rather, efforts must be about

> encouraging the adoption of emerging technologies by entrepreneurs and small businesses so that they are able to grow and exist for the longer term." – Business owner, Australia

The second mechanism by which digitalization allows for increased formalization is the provision of efficient and accessible public services. Whether to meet tax and business obligations or to take advantage of the benefits of belonging to the formal sector, digitalization optimizes processes and facilitates their use for citizens. The impact on promoting the formalization process and reducing the associated costs is that companies change their preferences and come to consider that the benefits of leaving informality outweigh the costs. In addition to changing the decisions of companies that had been informal, digitalization allows domestic administrations to penetrate areas where it could not reach before, so long as infrastructure capabilities and access to digital services are improved. In sum, digitalization allows for clearer, farther-reaching, and better services so that companies are attracted to formalization. This is part of e-government and increases the chances of companies transitioning to the formal sector.

> "For businesses that maybe have been kept out of, kept out of formality by maybe burdensome or, you know, overwhelming government regulations and procedures, digitalization could have a positive impact on formalization to help them to formalize. I think digitalization could help to streamline the procedures. For example, you do online submission as opposed to having to go to the various government agencies physically, which could be, I think, tiring and also very costly." – Expert from a multilateral organization.

The third mechanism by which digitalization contributes to formalization is the other aspect of e-government: the ability to supervise. The administrations´ ability to enforce its rules (supervise, observe, sanction) increases when governments adopt new technologies. Since it allows much more information to be handled and a greater number of companies registered, the digital transformation process allows administrations to monitor business activity better and identify companies that do not comply with regulations. The effect of digitalization is direct because it increases the enforcement capacity, and by increasing the likelihood of punishing informal operators, the incentives to formalize increase.

> "It's important to have enforcement and detection tools to increase the cost of remaining

informal. So that would encourage people and firms to implement formal practices." – Expert from a multilateral organization.

However, it is important to note that, according to some interviewees, digitalization can have the opposite of the desired effect with regard to formalization. In economies with high levels of informality in particular, the digital transformation of small and medium- sized enterprises can enhance their ability to avoid detection by tax authorities. Although productivity and company size increase, new digital tools can lead to economic activity becoming more dynamic, but this does not guarantee that formality increases. Digitalization can easily generate new jobs, which can promote informality if the jobs are relatively unstable.

> "I mean, what is interesting is that I think of digitalization, or I think we can refer to it as a double-edged sword. I mean, in a way it can help to formalize, but on the other hand, it also makes it easier to do transactions and to kind of avoid the formal channels." – Expert from a multilateral organization.

> "What we have seen of technology is that it generates forms of work that are a bit more complex for administrative systems, and it depends a lot on the type of economy. For example, it is a near recurring fact worldwide that paid work is easier to formalize or tends to be more formal than independent work. In cases where technology independently generates technological employment, there could be an incentive for informality." – Expert from a multilateral organization.

In the interviews, efforts have been made to highlight good practices by the government and companies regarding the relationship between digitalization and formalization. On the one hand, it was mentioned that it is important for governments to demonstrate how the money collected by tax authorities is used, and this increases incentives for companies to formalize. In Southeast Asian economies, citizens perceive public services to be high- quality, and therefore the benefits of formalizing are evident. On the other hand, the interviewees discuss how new technologies have already proven their efficiency in improving the control capacity of tax and labor authorities. Although this does not impact the formalization process directly, in several Latin American economies it has greatly assisted the task of tax and labor inspection. Finally, some participants remark that international multilateral organizations have programs aimed at supporting formalization policies, and many of them consider digital transformation as a crucial pillar to achieve their

objectives. These organizations take stock of all the aforementioned mechanisms, but they place greater importance on the optimization of public service provision for formalization. In addition, there is a search for improvement in the enforcement capacity of authorities and in the detection of informal practices.

> "Digitalization has a direction in our division, in the sense that it plays a very important role for tax administrations, for compliance, and all this is closely related to the formalization of the company. The direction is not specifically for formalization, but how digitalization can facilitate compliance with tax obligations that range from the very start of setting up a company to how to enforce tax obligations, filing a declaration, issuing an invoice, and also access to financing." – Expert from a multilateral organization.

The Peruvian Case

Unfortunately, high levels of informality in Peru can reduce the benefits of digitalization across all dimensions, and also with respect to increased formalization. Moreover, even with high levels of connectivity, internet access is not universal, and the market has yet to penetrate many areas, especially rural ones. These two aspects hinder Peruvian companies from benefitting fully from digitalization.

The mechanisms by which digitalization impacts formalization may be the same, but in Peru, the role of enforcement by domestic administrations is considered most important. Companies that have joined the digital transformation bandwagon may have improved their processes and increased their productivity. Still, as mentioned earlier with regard to developing economies, the appeal of formalizing remains very limited. However, the provision of public services for formalization does show improvements thanks to e-government, though this effect is not sufficient since the general perception is that domestic administrations do not make good use of the resources it collects.

> "First, training for informal companies on tax issues and basic accounting, since administrations are in "inspection" mode and do not take preventive education measures for future entrepreneurs. That's why the formalization rate does not grow." – Business owner, Peru.

The impact of digitalization by way of the first mechanisms - mainly productivity - is not sufficient;

however, when it comes to improvements in enforcement, Peru has made progress. Peru's tax authority (the Superintendence of Customs and Tax Administration – SUNAT) has a relatively well-developed digitalization policy that has yielded improvements in its inspection capacity. Before the adoption of new technologies, it was easier to inspect large companies, but currently its inspection capacity extends to all sizes of companies as long as they have records that the tax agency can use. Digitalization has therefore improved the inspection capacity in Peru and has changed incentives for companies to consider formalizing rather than run the risk of detection and penalization.

> "Those who participate in those digital markets are subject, for example, to a level of taxes or a level of identification that will lead them to formalize or will encourage them to formalize. I am not in favor, as I have already said, of penalizing informal companies, but I am in favor of there being some control, some monitoring, some inspection, especially when it comes to informality already at very high levels or when informality has to do with illegal practices or with a workplace that can be dangerous." – Expert from a multilateral organization.

9. Discussion and Scope of Results

Our study presents several significant results and conclusions. First, the results vary depending on the context. Given the variability of the phenomenon, we constructed empirical models to identify similarities and differences in the transition to formality. Our results confirm that digital transformation impacts business formalization: not directly but rather through increased productivity, motivation to grow, improved e-government, or the reduction of institutional voids, depending on the economy under analysis. Therefore, we consider it important to adopt a broader perspective when addressing the study of business formalization—one that takes into account the characteristics of economies and recognizes informality as a complex and multifactorial phenomenon.

Our quantitative and qualitative results highlight the importance of digital transformation in enhancing productivity (in both a general model and the Peruvian case) and promoting motivation for business growth (across all three models). Simultaneously, our findings align with the existing literature (Loayza, 2018; Alvarez-Berríos et al., 2018) by demonstrating that business formalization is intrinsically linked to productivity and motivation. The qualitative results indicate that the

improvement of operational efficiency acts as a key factor in the transition towards formality. This close relationship also explains why some APEC economies do not focus their policies on formalization but instead concentrate on facilitating and promoting increased business productivity in their respective economies. The organic growth of businesses intensifies the already pressing need for formalization, revealing a direct connection between expanding operations and the demand for more formal structures. In this context, digitalization emerges as an essential tool in enhancing business productivity while facilitating information management and administration. However, to ensure a successful transition, there is a need for tangible incentives such as cost reduction and tax benefits—factors that significantly influence businesses' motivation to embrace formality. Interviewees have stressed that variability in motivation, influenced by gender factors and individual perceptions of provided stimuli, exemplifies the complexity of this process.

At the same time, the role of institutions, underlined by the adoption of e-government and the reduction of institutional voids, constitutes a fundamental pillar, albeit with considerable variability across the studied economies. The model confirms a positive effect of digital transformation on the implementation of e-government practices (general model and Peru), as well as a negative effect on institutional voids (across all three models).

On the one hand, our analysis confirmed that corporate digital transformation can also influence public digitalization, acting as an external pressure for the digitalization of public services (Mergel, Edelmann & Haug, 2019). This was also corroborated by some interviewees, who noted that the upward trend of digital transformation in the market meant the government must adapt. This is unlike other cases in other developed APEC economies in which the government did not embrace digitalization despite their developed status, prompting complaints by businesses that the pace of their development was being curtailed. We also found that e-government has a positive impact on business formalization (in the general model and in Peru), confirming that proper implementation of e-government positively affects formalization (Williams, 2023a). The qualitative analysis results explain that digital transformation, through e-government, not only facilitates information gathering but also acts as a catalyst for formalization, providing incentives and optimizing supervisory capacity. The adoption of new technologies reinforces scrutiny and control, stressing the need for a robust digital infrastructure and appropriate regulations to maximize the connection between digitization and formalization.

In the case of the Philippines, the relationship between digital transformation and the improvement of e-government did not prove to be significant. E-government in the Philippines has been underexplored; however, existing literature indicates that due to the absence of a central mechanism for verification and review in the Philippine e- government, these platforms may be susceptible to politicization (Bajar, 2020).

However, digital transformation did prove to be significant as a determinant of reducing institutional voids for the Philippines and Peru, as well as the general model. While quantitative results indicate that digital transformation has positively impacted the provision of public services, interviewees point out that numerous obstacles in the legal infrastructure persist, hindering adequate support for the digital economy. This is a key area for improvement, as our findings suggest that reducing institutional voids may support business formalization. (This relationship was highly significant in the case of the Philippines.) The formalization process in the Philippines addresses formal institutional voids as the main variable for transitioning from informal to formal, which can be attributed to an unpredictable or unstable environment due to weak institutional rules (Puffer et al., 2010). This weakness appears to be partially strengthened by digital transformation. Large institutional voids increase transaction costs and limit the ability of companies to access resources and to enhance their innovation and entrepreneurial capacity. This lack of innovation affects the performance and competitiveness of businesses, posing a threat to the transition of informal businesses to formality (Roxas & Chadee, 2009; Peña et al., 2023).

With regard to the business environment and to industry cooperation, in the quantitative analysis we observed that digital transformation does have a positive impact on business cooperation for all three models yet does not exhibit a clear impact on formalization. The qualitative analysis results highlight that industry cooperation, driven by digitalization, creates value chains and improves economic activity. However, the direct relationship between these aspects and business formalization varies depending on the context and the size of the companies, revealing a complexity that inhibits the formation of a widespread consensus. On the one hand, it is observed that digital transformation allows women and minorities to integrate into economic activity, generally with some degree of compliance with formality, and there are even high levels of cooperation and training within APEC economies. However, the impact that this cooperation may have on formalization is not always evident and, in some cases, it is contradictory. In Peru there were some notable cases of banking cooperation with small and medium-sized enterprises in which difficult- to-detect digital wallets

allow for greater tax evasion by limiting the government's ability to monitor transactions. With regard to the control variables, we confirmed that young companies are more motivated to formalize, and gender does not have an impact on the motivation for formalization. These results are consistent with those studies that do not identify gender differences in the perception of the benefits of formalization and, at the same time, demonstrate that young companies perceive more benefits from formalizing compared to mature ones (Loayza, 2023). While the quantitative analysis does not reveal a gender difference in business formalization, conversations in the qualitative component identified important issues such as women's integration into economic activity facilitated by technology, enabling them to engage in entrepreneurial ventures and other tasks concurrently. It is possible that this emerging group of female entrepreneurs may not have been identifiable in the databases used, and therefore, that this effect may not have been captured in the quantitative analysis.

10. Best practices and some recommendations

The close relationship between digitalization and formalization highlights the urgent need to cultivate a robust digital infrastructure as well as adaptable regulations. To strengthen this positive connection, we suggest the implementation of the following best practices:

- Encouraging formalization through dialogue and knowledge:

The formalization of businesses is closely tied to the perception of tangible benefits, such as obtaining credit and expanding operations. However, many informal businesses may choose not to formalize due to a lack of knowledge about these benefits or simply because they do not consider them relevant. To address this challenge, we recommend the following:

- Two-way dialogue to understand unmet needs:

Establishing ongoing dialogue with the informal sector is essential, and understanding the reasons why businesses choose to remain informal provides valuable insights. Such a two- way exchange allows for the identification of unmet needs and the design of specific strategies to address them. For instance, surveys or interviews could be administered to small informal business owners to elucidate their concerns and perceptions regarding formalization. This information can be crucial for tailoring policies and support programs.

Providing significant advantages for formalization:

Building on the dialogue, it is crucial to design incentives and benefits that address the specific concerns of the informal sector. This may involve tax reductions, easier access to credit, and training programs tailored to their needs. For instance, establishing free advisory programs for informal businesses could provide guidance on the benefits of formalization and access to financial resources.

- Effective communication about the benefits of formalization:

The information about the benefits of formalization must be communicated clearly. Effective communication channels such as social media, government websites, and community events will serve to educate and raise awareness among informal businesses about the opportunities that formalization can offer. For example, online awareness campaigns could be launched to highlight success stories featuring businesses that have benefited from formalization, demonstrating tangible advantages in a practical manner.

This comprehensive approach is aimed not only at providing incentives for formalization but also at understanding and addressing the perceived barriers preventing informal businesses from seizing these opportunities. The information obtained through ongoing dialogue and effective communication may be the key to fostering a successful transition to formality.

- Reducing formalization costs through digitalization:

Digitalization proves instrumental in the effort to minimize costs associated with formalization. Clear examples include streamlining administrative procedures through electronic platforms and the use of digital signatures, which expedite and reduce bureaucratic processes.

- Harnessing digitalization to expand government reach:

Digitization provides the government with the opportunity to reach previously inaccessible areas. By enhancing infrastructure and access to digital services, it is possible to extend outreach with greater clarity, enticing businesses to formalize.

- Overcoming connectivity barriers:

It is essential to increase and enhance digital connectivity, especially in rural areas. Providing technological training to suppliers, customers, and entrepreneurs ensures that everyone can fully leverage the benefits of digitization.

- Legal framework supporting digital transformation:

Ensuring that digital laws and regulations encourage investment in digital transformation is crucial. The legal framework should support digital transactions without increasing informality levels, thus maintaining an adequate balance.

- Business and employee training:

Training businesses and their workers in information management is essential. This not only strengthens the relationship with customers but also enables access to credit and other financial benefits.

- Technological implementation approach:

The emphasis on reducing informality should be placed not on sanctioning but on implementing technology to increase productivity and business growth. Prioritizing training to informal businesses on fiscal matters and basic accounting before enforcement contributes to a smoother transition towards formality.

- Effective monitoring and oversight:

Leveraging digitalization to enhance monitoring and enforcement is key. Digital tools enable more efficient tracking, reducing tax evasion and strengthening formalization.

It is essential to note that while digitization boosts productivity, its implementation should be approached with caution in environments with high levels of informality, as it may create new unstable employment opportunities.

11. Concluding remarks

This study investigated the role that digitalization plays in the formalization processes of small and medium-sized enterprises in APEC economies. The mixed methodology employed allowed us to determine the dynamics between these two variables at the company level, as well as how the government can leverage this relationship. The quantitative analysis of surveys administered to businesses across several economies led us to conclude that the relationship between digital transformation and formalization is not direct. Therefore, it is necessary to consider other factors:

business productivity, motivation to grow, e-government, institutional voids, and company age . These factors allow us to delve into the complex relationship between digital transformation and business formalization. Therefore, to truly understand the accelerating role of digitalization in formalization processes, we focus on the various dimensions through which this relationship becomes evident.

The interviews conducted with experts on the subject and key agents from APEC economies have allowed us to identify the mechanisms through which digitalization can have a significant impact on the formalization process of businesses.

In conclusion, the intrinsic relationship between digital transformation and formalization is emphasized, characterized by increased productivity, entrepreneurial stimulus, efficiency in public service delivery, and supervisory capacity. This highlights the critical importance of having a robust digital connectivity supported by strong infrastructure and appropriate regulations. Best practices, such as transparency in fund management and improvements in control capabilities, along with bidirectional dialogue with both formal and informal actors, emerge as key foundations to strengthen the positive relationship between these two elements. However, a warning is issued that in economies with high levels of informality, digitalization could pose challenges by facilitating tax evasion and generating counterproductive effects to the desired objectives.

On one hand, while one of the objectives of this research was to capture the quantitative effect of connectivity on business formalization, this was not achieved due to the low response rate from many economies, which limited data collection by businesses and comparability between different economies. As a coping strategy, in-depth interviews were employed to capture economies with a low response rate and to inquire about the role of connectivity as a facilitator of digital business transformation, and hence, formalization. It is important to note that this study was cross-sectional, which fails to explain the dynamics and complexity of informality. On the other hand, this study was exploratory in nature, so further research is recommended to verify its applicability to different APEC economies and to gain a deeper understanding of specific determinants in each. In addition, the study only took into account variables that could be captured in a limited number of questions, so future research might entail a longitudinal study that replicates the model but incorporates other potentially relevant variables. If a diverse and representative sample can be obtained, future research could conduct a comparative study of developing and developed economies, comparing them by levels of

informality and digital connectivity. Lastly, the collected data could also be used in models that allow for the analysis of equifinality and multicausality using methods such as qualitative comparative analysis (QCA).

Appendix

Table 1: Description of variables

Constructs	Indicators	Description	Variables and scale
Business formalization	F1	In terms of the labor practices implemented in your company, what is the degree of compliance with the following procedures? – Formal labor contracting	Likert scale 1 to 6
	F2	In terms of the labor practices implemented in your company, what is the degree of compliance with the following procedures? – Payment of remunerations in accordance with the law	Likert scale 1 to 6
	F3	What year did the business start operating? – What year was the business formally registered?	Dichotomou s, 0 and 1
Digital transformation	DT1	What percentage of total sales has been allocated to digital transformation in the following activities? – Business model	Likert scale 1 to 6
	DT2	What percentage of total sales has been allocated to digital transformation in the following activities? –Work processes	Likert scale 1 to 6
	DT3	What percentage of total sales has been allocated to digital transformation in the following activities? – Customer engagement	Likert scale 1 to 6
	DT4	What percentage of total sales has been allocated to digital transformation in the following activities? – Products and services	Likert scale 1 to 6
	DT5	What percentage of total sales has been allocated to the use of new technologies for innovations in the last year? – Product innovation	Likert scale 1 to 6
	DT6	What percentage of total sales has been allocated to the use of new technologies for innovations in the last year? – Process innovation	Likert scale 1 to 6
	DT7	What percentage of total sales has been allocated to the use of new technologies for innovations in the last year? – Marketing innovation	Likert scale 1 to 6
	DT8	What percentage of total sales has been allocated to the use of new technologies for innovations in the	Likert scale 1 to 6

		last year? – Organizational innovation	
Productivity	P1	From the beginning of your operations to date, by what percentage has the performance of the following indicators of your business increased, on average? – Total sales	Likert scale 1 to 6
	P2	From the beginning of your operations to the present, by what percentage, on average, has the following business indicators increased? – Profit margin	Likert scale 1 to 6
	M1	How important are the following activities to you? – Increasing the number of full- time employees hired	Likert scale 1 to 6
Motivation to grow	M2	How important are the following activities to you? – Increasing the business's production capacity	Likert scale 1 to 6
	M3	How important are the following activities to you? – Developing new products or services for the business's core market	Likert scale 1 to 6
	M4	How important are the following activities to you? – Introducing improvements to products or services for the business's core market	Likert scale 1 to 6
	M5	How important are the following activities to you? – Investing in research and development activities, either internally or via contracts with other companies	Likert scale 1 to 6
Formal institutional voids	V1	At what level does the absence or failure of formal institutions (infrastructure, legal, and economic) make it difficult for your business to conduct efficient and effective market transactions? – Infrastructure	Likert scale 1 to 6
	V2	At what level does the absence or failure of formal institutions (infrastructure, legal and economic) make it difficult for the company to conduct efficient and effective market transactions? – Legal	Likert scale 1 to 6
	V3	At what level does the absence or failure of formal institutions (infrastructure, legal and economic) make it difficult for your business to conduct efficient and effective market transactions? – Economic	Likert scale 1 to 6
Electronic government	G1	How beneficial was the electronic tax payment process for your business in the last three years?	Likert scale 1 to 6

	G2	Over the last three years, what modality did your business use for the following government processes? – Tax payments	Likert scale 1 to 6
Electronic government	G3	Over the last three years, what modality did your business use for the following government processes? – Administrative procedures	Likert scale 1 to 6
Business Cooperation	C1	How important was the formalization and consolidation of your business to each of the following factors? – Internal and external cooperation	Likert scale 1 to 6
	C2	How important was the formalization and consolidation of your company to each of the following factors? – Competitors and other companies in the sector	Likert scale 1 to 6
	C3	How important was the formalization and consolidation of your business to each of the following factors? – Suppliers	Likert scale 1 to 6
Age of business	E1	Year of the survey – Year the company began operations	Continues
Gender	F1	What the percentage of your business's management team is comprised of women?	Likert scale 1 to 6

Annex 2: Guide for Conducting Interviews

Interviews were conducted with experts and researchers on informality and representatives from the business sector in APEC economies. The interviews took place virtually and lasted approximately one hour.

At the beginning, a brief presentation about the project, its main objectives, and the reason for the interviews is provided. The following list of questions is then used (presented in English as most of the interviews were conducted in this language), though the conversation was guided by flexibility and not necessarily restricted to this guide:

1. Resource-based perspective

    - What are the barriers to companies adopting digitalization?
    - What are the barriers to companies benefitting from digitalization?
    - Can you share success stories or challenges in which companies are able/unable to take advantage of the benefits of digitization?

2. Institution-based perspective

    - We think that factors on the territorial level, such as infrastructure, digital connectivity, and internet access, can influence the successful implementation of digitization and business formalization. We would like to hear your perspective on this premise and whether you agree or disagree with it.
    - What is your perspective about the possible causes of the lack of success in business formalization, despite the considerable efforts made by government policies?
    - Given that a survey is being administered in various APEC economies as part of this research, how could the unification of institutional norms between each economy be achieved, taking into account existing differences? Given the specific regulatory framework and context in each economy, what would be the most appropriate way to address this situation

to obtain comparable and meaningful results in the survey?

- What government policies do you recall being successful/unsuccessful for implementing digitalization?

3. Industry-based perspective

    - Do you think that sectoral heterogeneity affects the results, based on the type of industry and economic activity?

    - Which industries do you think are more digitalized or inclined towards digitalization than others?

4. Digitalization and company performance

    - Can you please provide some examples of digitalization in the economy that you have studied?

    - Do you think that digitalization affects business productivity? Can you provide examples?

    - What other factors contribute to digitalization and its effects on business productivity?

5. Formalization

    - How formalized is the economy that you operate in/study?

    - What the types of informality can been found in this economy?

    - Can you share any formalization success stories?

    - In your opinion, what are the drivers of formalization?

6. Formalization and digitalization

    - We would like your opinion on the potential of digitalization for business formalization in terms of registration, tax, and salary compliance. Do you think digitization can play a relevant role in these cases?
    - What variable do you think is crucial to complement the relationship between digitization and business formalization?

- We propose that innovation and the motivation to continue growing can play a fundamental role in the success of digitalization and business formalization. What is your opinion about this? How do you perceive the relationship between innovation and the digitization and formalization processes undergone by businesses?

- What are the future perspectives of digitization in terms of its impact on business formalization? How do you think this relationship will evolve in the coming years?

7. Control variables

    - Do you think that sectoral heterogeneity impacts the results based on business sizes and experiences?

    - Do you think there is a relationship between gender and digitization or formalization?

Annex 3: Table of proposed labels for codification and qualitative analysis of interviews

Theme	Group	Code	Found on interviews
Resource-based perspective	Digitalization adoption barriers	BAD – Barrier lack of knowledge	Yes
Resource-based perspective	Digitalization adoption barriers	BAD - Barrier lack of money	No
Resource-based perspective	Digitalization adoption barriers	BAD - Barrier lack of time	Yes
Resource-based perspective	Digitalization adoption barriers	BAD - Barrier bureaucracy	Yes
Resource-based perspective	Digitalization adoption barriers	BAD – Barrier difficulty	Yes
Resource-based perspective	Digitalization benefit barriers	BBD - Barrier internet access	Yes
Resource-based perspective	Digitalization benefit barriers	BBD - Barrier high costs	Yes

Resource-based perspective	Digitalization benefit barriers	BBD - Barrier infrastructure	Yes
Resource-based perspective	Digitalization benefit barriers	BBD - Barrier regulation	Yes
Resource-based perspective	Digitalization benefit barriers	BBD - Barrier data access	Yes
Resource-based perspective	Digitalization benefit barriers	BBD – Success internet access	Yes
Resource-based perspective	Digitalization benefit barriers	BBD – Success high costs	Yes
Resource-based perspective	Digitalization benefit barriers	BBD – Challenge internet access	Yes
Resource-based perspective	Digitalization benefit barriers	BBD – Challenge high costs	No
Institutions-based perspective	Digitalization and formalization factors	FDF - Broadband	Yes
Institutions-based perspective	Digitalization and formalization factors	FDF – Digital connectivity	Yes
Institutions-based perspective	Digitalization and formalization factors	FDF – Internet access	Yes
Institutions-based perspective	Business formalization failure	FFE – Insufficient policies	Yes
Institutions-based perspective	Business formalization failure	FFE – Inefficient programs	No
Institutions-based perspective	Business formalization failure	FFE - Altos Costos Formalization	Yes
Institutions-based perspective	International integration regulation	IRI – Integration benefits	No
Institutions-based perspective	International integration regulation	IRI – Integration mechanisms	No
Institutions-based perspective	International integration regulation	IRI - Unification of Standards	No
Institutions-based perspective	International integration regulation	IRI – International implementation	No
Institutions-based perspective	Digitalization policy success	Cost reduction	Yes
Institutions-based perspective	Digitalization policy success	EPD – Monetary incentives	Yes

Institutions-based perspective	Digitalization policy success	EPD – Public private partnerships	No
Institutions-based perspective	Digitalization policy success	EPD - Infrastructure	Yes
Institutions-based perspective	Digitalization policy success	EPD – Tax regime	Yes
Industry-based perspective	Digitalization by sector	DPS – Differentiated impact	Yes
Industry-based perspective	More digital sectors	SMD - Technology	Yes
Industry-based perspective	More digital sectors	SMD - Services	Yes
Industry-based perspective	More digital sectors	SMD - Industry	No
Industry-based perspective	More digital sectors	SMD - Telecommunications	Yes
Industry-based perspective	More digital sectors	SMD - Baking	Yes
Industry-based perspective	More digital sectors	SMD – Other sectors	Yes
Company design and digitalization	Digitalization and productivity	DYP – Affects productivity	Yes
Company design and digitalization	Digitalization and productivity	DYP – Does not affect productivity	No
Formalization and digitalization	Digitalization in formalization factors	FDEF - Registration	Yes
Formalization and digitalization	Digitalization in formalization factors	FDEF - Taxes	Yes
Formalization and digitalization	Digitalization in formalization factors	FDEF – Labor rights	No
Formalization and digitalization	Digitalization in formalization factors	FDEF – Company size	Yes
Formalization and digitalization	Digitalization in formalization factors	FDEF - Supervision	Yes
Formalization and digitalization	Role of innovation	RDI – Digitalization	Yes

		important	
Formalization and digitalization	Role of innovation	RDI - Formalization important	No
Formalization and digitalization	Role of innovation	RDI – Both important	Yes
Formalization and digitalization	Future of digitalization in formalization	FUDF - Important	Yes
Formalization and digitalization	Future of digitalization in formalization	FUDF – Limited relationship	No
Control variables	Role of company size	RTE - Important	Yes
Control variables	Role of gender	RDG - Important	No

Summary Report

I. Scope of the study:

Through a mixed-methods study encompassing quantitative analysis and qualitative insights, the research demonstrates that digital transformation positively impacts business productivity and motivation, thereby encouraging formalization. However, it also unveils that successful formalization cannot rely solely on digital initiatives; supporting public services, capacity to regulate, and addressing institutional gaps are equally important. Results illustrate how the context of digital infrastructure influences these relationships, showing that the efficacy of e-government services can directly correlate with business formalization rates. The findings spotlight the critical interplay between digitization and formalization efforts while emphasizing that the outcomes must be contextualized within the distinct socio-economic environments in which businesses operate.

The examination of informality within APEC economies reveals a multifaceted issue that is comprehensive to understanding the economic dynamics in the region. With APEC being a crucial player in global trade and economic growth, the complexities surrounding informality, which affects numerous workers and businesses, cannot be overlooked. The discussion begins with a literature review emphasizing the diverse definitions, prevalence, and overall significance of informality across the 21 member economies. This exploration is vital as it sets the foundation for understanding the various forms and implications of economic activities that exist outside formal structures, often characterized by regulations, taxation, and government oversight.

The factors that influence informality and the potential pathways toward formalization are critical considerations. Through an analysis of digital connectivity, it's observed that as economies become more digitized, businesses find new methods to navigate the formal-informal divide. This relationship underscores the potential for digital transformation to facilitate formalization, which is intricately linked to the regulatory frameworks and technological advancements in APEC economies. As member economies prepare for ongoing discussions around economic development, these insights can help shape strategic approaches to tackle the challenges of informal sectors while leveraging digital advancements.

II. Approaches to informality:

A mixed-methodological approach underpins the analysis of this phenomenon, with both quantitative and qualitative components designed to enhance the robustness of the findings. These methodologies provide a clearer understanding of the current state and impacts of informality, ultimately leading to actionable recommendations.

The emphasis on data-driven assessments ensures a comprehensive evaluation of how informality interacts with economic indicators such as GDP contribution, highlighting the stark contrast among member economies like Peru; Thailand; and the US, which differ significantly in the scale and impact of informal sectors.

The empirical insights gleaned from this research not only underscore the need for nuanced policy responses aimed at fostering formalization but also advocate for interdisciplinary research to further decode the complexities of informality. Addressing informality requires understanding its various dimensions and the unique socioeconomic landscapes of member economies. By tailoring policies to meet the diverse needs of informal workers and small enterprises, APEC can enhance economic stability and sustainability for all its members.

III. Diagnosis of informality in APEC economies:

The informal sector plays a crucial role in the economic landscape of developing economies, with a strong correlation between informality and poorer human development conditions. A deep dive into APEC economies reveals that those with lower Human Development Index (HDI) scores, which evaluate factors like life expectancy, education, and income, tend to experience higher informality rates. For instance, while Hong Kong, China enjoys a high HDI score of 95.2%, Papua New Guinea lags behind at 55.8%. These statistics underscore how informality is both a symptom and a contributor to sluggish economic growth in certain areas, prompting a need for decisive measures to address its root causes and foster social inclusion.

Informality is not merely a byproduct of economic stagnation; it significantly hampers productivity and competitiveness within economies. With around 70% of jobs in developing economies absorbed by the informal sector, the economic drawbacks become apparent. Informal enterprises face inherent limitations that stifle their capacity to innovate and compete fairly, perpetuating a cycle of disadvantage. This issue is compounded by unfair

trade practices, which place formal businesses at a disadvantage, further entrenching the challenges posed by informality in contributing to overall economic development. Various studies confirm that innovation is essential for companies to gain a competitive edge, emphasizing the need to prioritize its cultivation across all sectors.

The level of innovation adopted by APEC economies is a telling indicator of their economic health. Statistics from the Global Innovation Index for 2022 spotlight Korea as a leader, while developing economies such as Papua New Guinea and Viet Nam showcase starkly lower rates of innovation adoption. A critical analysis of the data indicates a notable negative correlation between levels of informality and innovation; economies with pervasive informality tend to exhibit lower levels of innovative activity. This relationship signifies that for economies aiming to enhance their economic robustness, addressing informality and fostering innovation should be top priorities.

V. Competitiveness landscape:

An examination of the competitiveness landscape within APEC economies further reveals the interplay between competitiveness and informality. High-performing economies like Hong Kong, China; Singapore; and United States demonstrate strong competitiveness scores, whereas APEC economies like Papua New Guinea show alarming levels of informality coupled with low competitiveness. This dichotomy illustrates a broader trend where competitive economies tend to have more robust formal sectors, enhancing their growth prospects. Consequently, a multifaceted approach targeting improvements in innovation and reductions in informality appears paramount for facilitating economic resilience and sustainability across APEC economies.

APEC economies exhibit varying degrees of competitiveness and informality, as reflected in the correlation between the Global Competitiveness Index and informal GDP contributions, which shows a significant negative correlation (−0.65). Informality represents a complex issue with substantial economic and social repercussions, primarily in emerging economies, where bureaucracy, excessive regulation, low productivity, and inadequate financial access contribute to its prevalence. Small firms with limited resources and skills are notably susceptible to informality due to their challenges in accessing credit and overcoming high operational costs.

The literature identifies numerous challenges linked to business formalization, including bureaucratic obstacles, tax burdens, and competition levels. Increasing formalization is associated with benefits such as improved organizational performance and reduced costs, suggesting that interventions to enhance labor productivity and institutional efficiency could make formality more appealing. Institutional frameworks, which include legal structures and industry norms, play a vital role in shaping decisions related to informality and formalization. Furthermore, easing bureaucratic hurdles and enhancing access to credit are essential strategies for encouraging formalization.

The ILO proposes comprehensive strategies emphasizing the transition from informal to formal economies, urging respect for workers' rights and consistent employment policy integration. Digital connectivity, which encompasses various technologies that facilitate the transmission of data, is recognized for its impact on economic development and productivity. Particularly, mobile applications and internet access contribute to business digitization and regional integration. Despite substantial progress, there remains a pronounced digital divide, especially in emerging economies, where disparities in broadband access and adoption hinder full participation in the digital economy. Effective measures to address connectivity issues include enhancing digital infrastructure and ensuring equitable access to technology. APEC economies collectively play a significant role in global trade and economic output, notably with China; Japan; and the United States leading in industrial capacities. However, challenges persist for low-income economies regarding digital access, highlighted in a World Bank report that delineates the coverage, usage, and consumption gaps affecting digital connectivity.

The Broadband Development Index serves as a tool to assess the digital divide, focusing on public policies and infrastructure to understand the level of digital inclusivity across APEC economies. Preliminary rankings indicate that economic powerhouses perform relatively well, underscoring the need for continuous assessment and investment in digital capabilities to foster an inclusive growth environment. Addressing these issues holistically is essential for creating strong pathways for digitization that promote formalization, boost productivity, and ultimately contribute to a more robust economic landscape in APEC regions. The interplay between formalization and digital connectivity reveals an intricate relationship where improved access to technology can facilitate a smoother transition from informal practices to formal business operations. Streamlined processes and an environment conducive to entrepreneurship can significantly enhance the formal sector's viability, while

digital instruments can further aid in overcoming existing barriers to formalization. Crafting favorable conditions for small and medium-sized enterprises (SMEs) through technology adoption can yield substantial returns, fostering a culture of compliance and enhancing overall economic engagement. Policymakers must consider both the challenges inherent in the historical context of informality and the contemporary impacts of digital advancements when planning interventions to stimulate growth and formalization. This multifaceted approach will enable APEC economies to capitalize on the benefits of an increasingly interconnected world, reducing the shadows of informality and fostering sustainable development amidst evolving economic landscapes. Unlocking the potential of digital connectivity may not only elevate business performance but also enhance the character of compliance among enterprises, ultimately leading to a more formalized economic structure capable of withstanding market fluctuations while contributing to broader socio-economic objectives across the APEC region.

The Broadband Development Index 2022 Annual Report highlights the varying levels of internet access and technological infrastructure across different economies, particularly focusing on North American and Asian economies, which generally score higher in the index. In contrast, Latin American economies, especially those in APEC, face challenges with lower scores and internet access rates. For instance, only 48.7% of households in Peru had internet access in 2022, compared to an average of 66.2% in Latin America and 90.3% in OECD members. Additionally, the International Institute for Management Development (IMD) emphasizes the importance of technological infrastructure in its global competitiveness rankings, showcasing how crucial broadband technology and internet access are for development.

The differences in broadband access between North American, Asian, and Latin American economies can be attributed to several key factors:

a. Investment in Technological Infrastructure: Higher-income economies, particularly in North America and parts of Asia, tend to have greater levels of investment in technological infrastructure. This includes investments in broadband technology, internet access, and communication technologies, which facilitate better connectivity.

b. Government Policies and regulation: The regulatory environment plays a significant role in promoting or hindering broadband access. North American and some Asian economies have established supportive policies that encourage private investment in digital infrastructure, while Latin American economies may lack similar frameworks, resulting in lower levels of connectivity.

c. Economic Development Levels: Generally, more developed economies exhibit higher levels of digital connectivity. In contrast, lower-income and developing economies often struggle with limited access to technological services and infrastructure, which can perpetuate the digital divide.

d. Public-Private Partnerships: Successful broadband deployment often relies on collaboration between public and private sectors. Economies that foster strong partnerships tend to achieve better outcomes in terms of internet access and technological advancement.

e. Geographical and Demographic Factors: The geographical layout and population density can also impact broadband access. Urban areas typically have better infrastructure compared to rural regions, which can be more pronounced in Latin American economies where rural connectivity is often lacking.

f. Cultural and Educational Factors: The level of digital literacy and the population's ability to utilize digital tools can influence broadband adoption. Economies that prioritize education and digital skills development tend to see higher rates of internet usage and engagement in the digital economy.

VI. Implications of low internet access rates:

Low internet access rates in Latin American economies have several significant implications for economic development, including the following ones:

a. Limited economic opportunities: Low internet access restricts the ability of individuals and businesses to engage in online commerce, access global markets, and leverage digital tools for business growth. This can hinder entrepreneurship and innovation, which are crucial for economic development.

b. Reduced productivity: Businesses that lack reliable internet access may struggle to adopt digital technologies that enhance efficiency and productivity. This can lead to slower economic growth and competitiveness compared to economies with better connectivity.

c. Inequality in access to information: Limited internet access exacerbates information asymmetry, where only a portion of the population can access vital information about job opportunities, market trends, and educational resources. This can deepen social and economic inequalities within economies.

d. Challenges in education and skill development: The digital divide affects educational opportunities, as students in areas with low internet access may miss out on online learning resources and digital literacy training. This can result in a workforce that is less prepared for the demands of a digital economy.

e. Impediments to E-Government Services: Low internet access can hinder the effectiveness of e-government initiatives, which aim to improve public service delivery and citizen engagement. Without adequate connectivity, citizens may struggle to access essential services, such as tax payments and business registrations, which can perpetuate informality in the economy.

f. Stagnation in Digital Transformation: Economies with low internet access may find it challenging to undergo digital transformation, which is essential for modernizing industries and improving overall economic resilience. This stagnation can leave economies vulnerable to external shocks and less adaptable to changing global trends.

g. Impact on Foreign Investment: Investors often seek regions with robust digital infrastructure. Low internet access can deter foreign direct investment, as companies may be reluctant to invest in markets where connectivity is a barrier to operational efficiency

Overall, low internet access rates can significantly hinder the economic development of Latin American economies by limiting opportunities for growth, innovation, and social

equity. Addressing these connectivity challenges is crucial for fostering a more inclusive and competitive economic environment.

VII. The Broadband Development Index (BDI):

The BDI measures technological infrastructure through a comprehensive assessment that includes various components related to broadband access and usage, including the following ones:

a. **Broadband Technology Availability:** The index considers the availability of different types of broadband technologies, such as fiber-optic, DSL, cable, and satellite. This helps to assess the range of options available to consumers and businesses for internet access.

b. **Internet Access Rates:** The BDI evaluates the percentage of households and individuals with internet access. This metric provides insight into how widespread connectivity is within a given economy, highlighting disparities between urban and rural areas.

c. **Number of Communication Technology Users:** The index tracks the number of users of various communication technologies, including mobile and fixed-line services. This helps to gauge the overall penetration of communication services in the population.

d. **Public-Private Partnerships:** The effectiveness of partnerships between public and private sectors in developing broadband infrastructure is considered. This includes evaluating initiatives that promote investment in technology and infrastructure development.

e. **Cybersecurity Measures:** The BDI also assesses the presence of cybersecurity measures and policies that protect users and infrastructure. A robust cybersecurity framework is essential for fostering trust in digital services and encouraging broader internet adoption.

f. **Regulatory Environment:** The index examines the regulatory framework governing telecommunications and broadband services. Effective regulations can facilitate competition, improve service quality, and encourage investment in infrastructure.

g. **Investment in Infrastructure:** The level of investment in broadband infrastructure, both public and private, is a critical factor. This includes funding for expanding networks, upgrading technology, and ensuring that infrastructure keeps pace with demand.

By combining these various components, the Broadband Development Index provides a holistic view of the technological infrastructure within an economy, allowing for comparisons between different economies and regions. This assessment helps identify areas for improvement and investment to enhance broadband access and digital connectivity.

VIII. Institution-based perspective:

Several studies have highlighted the positive effects of digital transformation on productivity in businesses. Digital transformation involves significant changes across an organization, leading to new business models and improved productivity through the adoption of advanced technologies and better management practices. It supports formal accounting and reporting systems, helping companies handle administrative challenges more effectively. Therefore, it's proposed that digital transformation significantly boosts business productivity.

Moreover, digital transformation enhances entrepreneurial motivation by improving operational efficiency, adaptability, and competitiveness. This change fosters a culture focused on growth and formalization within companies. Research shows that digital transformation heightens organizational resilience, enables new business models, and strengthens competitiveness. As a result, it is suggested that digital transformation positively impacts entrepreneurs' motivation.

From an institutional perspective, government capacity significantly affects firms' strategies and performance. E-government initiatives can enhance business formalization by easing

registration and tax processes, promoting transparency and efficiency. However, increased regulation could potentially push some businesses back into informality. Therefore, it is proposed that e-government positively impacts business formalization.

On the other hand, institutional voids such as inefficient bureaucracy can hinder business formalization. Many entrepreneurs face excessive administrative hurdles and high taxes, which may drive them to operate informally as a way to escape these burdens. It is proposed that bureaucratic institutional voids negatively affect business formalization.

The industry-based perspective focuses on how industry characteristics shape firm behavior. Entrepreneurial cooperation, defined as collaboration between businesses to enhance competitiveness and innovation, is crucial for formalization. When businesses work together in a supportive environment, they can access more resources, including financing. However, negative factors like corruption and excessive regulation can impede this cooperation. It is proposed that business cooperation positively influences business formalization.

The resource and capability-based perspective emphasizes how firms' resources and capabilities create competitive advantages. Higher productivity is linked to a greater likelihood of businesses becoming formal as it leads to increased revenues and operational efficiency. This can position firms better to comply with formal requirements. Thus, it is proposed that business productivity has a significant positive impact on formalization.

Additionally, company motivation to grow plays a crucial role. Growth drives profitability and job creation, and motivation is essential for formalization. However, this motivation must align with supportive environments and governmental backing to ensure greater access to market opportunities. Thus, it is suggested that the motivation to grow positively influences formalization.

Lastly, digital transformation is described as not just adopting technology but also undergoing an organizational culture shift, which enhances operations, business models, and stakeholder experiences. This transformation can help businesses capitalize on digital opportunities to innovate and improve decision-making, thereby adding value. Overall, these relationships underscore the significant impact of digital transformation on productivity, entrepreneurial motivation, and business formalization.

IX. Digital Transformation and business collaboration:

The report discusses the role of digital transformation in enhancing business collaboration and efficiency, emphasizing its significance for various stakeholders such as suppliers, partners, and competitors. It highlights findings from studies showing that digital transformation positively impacts business collaboration and innovation partnerships.

Digital transformation is also identified as a major factor influencing e-government, helping to improve the formalization of public services through better interaction between businesses and government institutions. This relationship is essential for enhancing transparency and communication, particularly in regulatory and environmental matters.
Furthermore, the report addresses how institutional voids within public bureaucracy can be mitigated through digital transformation, which aids in identifying and providing detailed market information. This transformation supports financial inclusion, benefiting smaller firms alongside larger ones.

The influence of digital transformation on business formalization is also noted, as it encourages innovative business models facilitated by digital platforms like email and social media. Companies that focus on innovation are more likely to formalize their operations compared to those with slower growth.

The research methodology employed is a mixed approach combining quantitative data from surveys conducted among 603 entrepreneurs in various APEC economies and qualitative insights from semi-structured interviews. The study aims to identify factors impacting the formalization process in business.

Data analysis utilized the Partial Least Squares (PLS) structural equation model and assessed various variables related to business formalization and digital transformation, including productivity, motivation, e-government, institutional voids, and cooperation. Reliability and validity of the model were ensured through various tests, indicating strong relationships between the variables analyzed.

X. Empirical models of Peru and the Philippines:

The preliminary results from three models, including a general model and specific models for Peru and the Philippines, show positive associations among the variables studied, confirming the importance of digital transformation for business formalization in diverse contexts. All variables except e-government demonstrated strong reliability, and the overall

model supports the proposed hypotheses regarding the impacts of digital transformation on collaboration, e-government, and institutional voids.

The report discusses the findings from a study on the impact of various factors on business formalization in the Philippines and Peru, focusing on digital transformation (TD), e-government (G), business productivity (P), institutional voids (V), motivation to grow (M), business cooperation (C), and formalization (F).

In both economies, most relationships were found to be significant, except for a few specific connections. For the Philippines, digital transformation did not significantly influence e-government or formalization, while productivity did not impact formalization either. In contrast, the results for Peru indicated that digital transformation enhanced business formalization through increased productivity and leveraging e-government. Important elements for formalization included a motivation to grow, which encourages businesses to recognize available opportunities.

The analysis emphasized that formal institutional voids did not negatively affect formalization due to various contributing factors like regulatory burdens. There has also been a government push toward digitization, which benefits business formalization efforts.

The study highlighted that while digital transformation plays a significant role in improving productivity, motivation, cooperation, and addressing institutional voids, it does not directly impact formalization. Connectivity associated with digital transformation varies significantly in the two economies. The Philippines faces challenges in digital connectivity compared to other economies, evident through lower rankings in the E-Government Development Index.

The reliability and validity of the variable models were confirmed, showing strong internal consistency, and the discriminant validity passed set criteria, ensuring the measures effectively captured distinct constructs. Overall, the findings underscore the necessity of digital transformation and connectivity in promoting business formalization in Peru and the Philippines, while also noting specific areas needing attention, particularly in the Filipino context.

XI. Qualitative analysis:

The report outlines the findings of a study on the relationship between digital transformation and formalization across APEC economies. It summarizes quantitative results showcasing various hypotheses related to the effects of digital transformation, e-government, and institutional factors on formalization, highlighting significant positive relationships, especially in the global and Peru models.

Additionally, the study included qualitative interviews with experts from academia, business, and organizations related to APEC member economies. These interviews aimed to provide deeper insights into how economies can enhance their formalization processes through digitization. A diverse group of participants discussed the mechanisms of formalization, underscoring key themes such as the necessity of increased productivity and motivation for companies to transition from informal to formal status.

Interviewees emphasized that as companies grow, they require more formalization to streamline processes and improve management. They also pointed out that digitization significantly boosts productivity, advocating for clear incentives to motivate informal businesses towards formalization, such as tax benefits and simpler registration processes. The study indicated that many businesses, especially in developing economies, do not feel sufficiently encouraged to formalize.

Moreover, the role of gender was highlighted, noting that women are more likely to engage in formal entrepreneurship. Digital tools can aid in providing necessary incentives for formalization and enhancing the overall business climate. The analysis also indicated that training for workers is vital to leverage digital tools effectively, ultimately leading to improved individual and business productivity.

The findings present several dimensions through which digital transformation affects businesses, including fostering innovation and overall growth. The study concludes that understanding and addressing the motivations for businesses to remain informal is essential for developing effective strategies for formalization.

The analysis focuses on how small companies, particularly in the manufacturing sector, can enhance productivity and efficiency through digital tools. It emphasizes that while digital transformation is essential for innovation, it does not guarantee that companies will

formalize their operations. Factors like productivity, motivation, and incentives play a crucial role in this transition. Entrepreneurs noted that tools like social media for marketing and cloud services for operations have significantly aided their businesses.

In Peru, the link between digitization and formalization reflects trends seen in other economies, where increased productivity and motivation are needed for businesses to formalize. Many small and medium-sized enterprises lack proper incentives to transition from the informal to the formal sector, leading them to perceive remaining informal as more beneficial. As a result, informal businesses often have low productivity and little motivation to change.

The text also explores the role of government institutions in this process. It highlights the potential of e-government to improve service delivery and oversight, thereby encouraging formalization. Digital tools not only help in collecting information but also enable better supervision of businesses. Interviewees agree that effective government enforcement is crucial to attracting informal businesses to the formal sector.

Despite the benefits of digitization, several challenges persist in Peru. Although technological advancements can significantly boost productivity, they are often more beneficial for formal companies with greater resources. Informal businesses may innovate, but this does not guarantee a shift to formalization, especially if the advantages of formal status are unclear. Obstacles like inadequate internet access and low technological knowledge hinder digitization efforts.

XII. The role of industry:

Technology companies and the banking sector are driving digital transformation across various industries, which benefits the economy but has not significantly affected levels of business formalization. Interviews revealed that the likelihood of companies formalizing through digital means depends more on their size rather than their industry. Digital tools, particularly smartphones, have made it easier for small and medium enterprises (SMEs) to access market information and expand their opportunities. Increased digital cooperation among companies can enhance business processes, leading to increased productivity. However, in economies with high informality, such as Peru, this digital progress can inadvertently worsen formalization, as businesses can carry out unreported transactions.

While digital wallets have simplified operations for many, they can also allow companies to operate outside the formal system. The relationship between digitalization and formalization has been analyzed, indicating that while digital transformation can help formalize businesses, there are challenges. For successful digitalization, adequate infrastructure and clear regulations are essential. Governments must create a supportive legal framework for digital transactions, as poorly regulated environments may lead to higher informality.

Digitalization has numerous benefits, including better data analytics for understanding customers and improving credit access, yet many businesses remain unaware of these advantages or perceive the formalization process as too costly. Increased productivity from digitalization can lead to a natural shift towards formalization, as the burdens of regulations become manageable for growing businesses. Additionally, providing efficient public services through digital means can alleviate the costs associated with formalization, encouraging companies to transition from informality.

The government's ability to enforce regulations improves through digitalization, providing them with better tools for oversight. However, for some businesses in high-informal economies, these tools may enhance their ability to evade detection instead of leading to formalization.

The influence of industry on digitalization and formalization levels is unclear, as these factors seem more dependent on individual economic contexts. While some sectors are more digitally inclined, like banking, the overall impact of digital tools on formalization appears to hinge on the specific circumstances of each economy, including the size and existing infrastructure of the businesses. Cooperation among companies across different sectors plays a crucial role in benefiting from digitalization, as it facilitates innovation and enhances business practices.

Overall, while digitization holds promise for improving formalization rates, particularly in developing economies, there are multiple barriers that must be addressed to maximize its potential benefits.

XIII. Conclusion:

Digitalization and the use of digital tools can enhance productivity and compliance but may also foster informality. Experts highlight that while digitalization can streamline administrative processes and improve tax enforcement, high levels of informality can limit its benefits. Case studies, particularly from Peru, illustrate that digital transformation can enhance inspection capabilities but requires substantial enforcement to encourage formalization. The study advocates for a nuanced approach to understanding formalization, focusing on the unique characteristics of economies and urging the implementation of best practices to support SMEs in transitioning from informal to formal status.

XIV. Key Insights:

- Digitalization serves as a “double-edged sword”, facilitating both formalization and informality.
- The relationship between digital transformation and formalization is influenced by productivity, motivation, and the effectiveness of e-government initiatives.
- High levels of informality hinder the benefits of digitalization, particularly in less developed economies like Peru.
- Effective training and communication are essential to help informal businesses understand the benefits of formalization.
- Enhanced monitoring through digital tools can improve tax compliance and encourage businesses to formalize.
- Digitalization can improve productivity, streamline administrative processes, and enhance compliance with tax obligations, ultimately encouraging formalization.
- High levels of informality can limit the potential benefits of digitalization, as many informal businesses may not engage with digital tools or comply with formal regulations.
- Governments can promote formalization by improving public services, enhancing enforcement capabilities, and creating tangible incentives for businesses to transition to formal status.

- Strategies include effective communication about the benefits of formalization, providing training and support, and reducing costs associated with the formalization process through digital platforms.

Acknowledgements

1. The authors would like to express their gratitude to the Asia-Pacific Economic Cooperation (APEC) for the funding provided.

2. Likewise, we extend our sincere thanks to Renato Reyes and Jorge Guillermo García Manrique from the Ministry of Foreign Affairs of Peru for their invaluable efforts in contacting interviewees and achieving the objectives outlined in Section 8. Their dedication and hard work have been instrumental in the development and success of this work.

3. Special thanks to ComexPerú for their continuous support in obtaining information from businesses.

4. Acknowledgements also go to Jorge Luis Peña Contreras and Sebastián Zambrano Freyre for their assistance and support in the research development.

5. Finally, a special appreciation to the companies that participated in the survey and the interviewees who played a significant role in this research.

12. References

Abdalla, S., & Nakagawa, K. (2021). The interplay of digital transformation and collaborative innovation on supply chain ambidexterity. Technology Innovation Management Review, 11(3).e Publishers.

Abramo, L. (2022). La evolución del concepto de informalidad en América Latina y nuevos desafíos para la protección social y laboral. RBEST Revista Brasileira de Economia Social e do Trabalho, 4, e022013-e022013.

Adamik, A., & Nowicki, M. (2018). Preparedness of companies for digital transformation and creating a competitive advantage in the age of Industry 4.0. In Proceedings of the International Conference on Business Excellence (Vol. 12, No. 1, pp. 10-24).

Adu-Gyamfi, R., Kuada, J., & Asongu, S. A. (2023). An integrative framework for formal and informal entrepreneurship research in Africa. Journal of African Business, 24(2), 167-187.

Aguilar, A.C., Muñoz, T.M.G., Moro-Egido, A.I., (2013). Heterogeneous self-employment and satisfaction in Latin America. J. Econ. Psychol. 39, 44–61. https://doi.org/10.1016/j.joep.2013.07.001

Agustian, K., Mubarok, E. S., Zen, A., Wiwin, W., & Malik, A. J. (2023). The Impact of Digital Transformation on Business Models and Competitive Advantage. Technology and Society Perspectives (TACIT), 1(2), 79-93.

Alvarez-Berríos, N., L'Roe, J., & Naughton-Treves, L. (2021). Does formalizing artisanal gold mining mitigate environmental impacts? Deforestation evidence from the Peruvian Amazon. Environmental Research Letters, 16(6), 064052.

APEC (2022b). Enhancing Implementation of APEC Connectivity Blueprint in the Digital Era: Digital Connectivity for Stronger Recovery. APEC Policy Support Unit.

APEC. (2022a). Stepping outside the shadows: Informality and digitalisation. https://www.apec.org/docs/default-source/publications/2022/4/stepping-outside-the-shadows-informality-and-digitalisation/222_psu_informality-and digitalisation.pdf?sfvrsn=80c289d1_2

Bajar, J. T. (2020). E-Government in the Philippines: An Assessment. Ciencia: Humanities, Education, Arts, Languages, and Social Sciences (HEALS), 1(1), 26-50.

Banco Mundial (2019), "Innovative Business Models for Expanding Fiber-Optic Networks and Closing the Access Gaps", Alianza para el Desarrollo Digital, Banco Mundial, Washington, DC. https://documents1.worldbank.org/curated/en/674601544534500678/pdf/Main-Report.pdf

Banerjee, A., Duflo, E., Chattopadhyay, R., & Shapiro, J. (2011). Targeting the hard-core poor: an impact assessment. Unpublished paper. http://www. povertyactionlab. org/publication/targeting-hard-core-poor-impact-assessment.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of management, 17(1), 99-120.

Barron, M. (2020). Business training programs and microenterprise formalization in Peru. Cogent Economics & Finance, 8(1), 1791546.

Beamish, P. W., & Lupton, N. C. (2016). Cooperative strategies in international business and management: Reflections on the past 50 years and future directions. Journal of World Business, 51(1), 163-175.

Benhassine, N., Mckenzie, D. J., Pouliquen, V., & Santini, M. (2016). Can enhancing the benefits of formalization induce informal firms to become formal? Experimental evidence from Benin. Experimental Evidence from Benin (November 29, 2016). World Bank Policy Research Working Paper, (7900).

Benhassine, N., McKenzie, D., Pouliquen, V., & Santini, M. (2018). Does inducing informal firms to formalize make sense? Experimental evidence from Benin. Journal of Public Economics, 157, 1-14.https://doi.org/10.1016/j.jpubeco.2017.11.004

Benhassine, N., McKenzie, D., Pouliquen, V., & Santini, M. (2018). Does inducing informal firms to formalize make sense? Experimental evidence from Benin. Journal of Public Economics, 157, 1-14.

Berkel, H. (2018). The costs and benefits of formalization for firms: A mixed-methods study on Mozambique (No. 2018/159). WIDER Working Paper.

Berkel, H., & Tarp, F. (2022). Informality and firm performance in Myanmar. The Journal of Development Studies, 58(7), 1363-1382. https://doi.org/10.1080/00220388.2022.2061849

Boly, A. (2018). On the short-and medium-term effects of formalisation: Panel evidence from Viet Nam. The Journal of Development Studies, 54(4), 641-656.

Bosch, M., & Esteban-Pretel, J. (2012). Job creation and job destruction in the presence of informal markets. Journal of Development Economics, 98(2), 270-
286.https://doi.org/10.1016/j.jdeveco.2011.08.004

Bu, J., & Cuervo-Cazurra, A. (2020). Informality costs: Informal entrepreneurship and innovation in emerging economies. Strategic Entrepreneurship Journal, 14(3), 329-368.

Busso, M., Chauvin, J. P., & Herrera, N. (2021). Rural-urban migration at high urbanization levels. Regional Science and Urban Economics, 91, 103658. https://doi.org/10.1016/j.regsciurbeco.2021.103658

Capasso, S., Ohnsorge, F., & Yu, S. (2022). Informality and financial development: A literature review. The Manchester School, 90(5), 587-608.
https://doi.org/10.1111/manc.12417

Carr, M., Chen, M. A., & Tate, J. (2000). Globalization and Home-Based Workers. Feminist economics, 6(3).

Castells, M., (2004). The Network Society: A Cross-Cultural Perspective. Edward Elgar Publishing,Incorporated.

Castells, M., Portes, A., (1989). World underneath: The origins, dynamics, and effects of the informal economy.

Cavotta, V., & Dalpiaz, E. (2022). Good apples in spoiled barrels: A temporal model of firm formalization in a field characterized by widespread informality. Journal of Business Venturing, 37(2) https://doi.org/10.1016/j.jbusvent.2021.106188

Cavotta, V., & Dalpiaz, E. (2022). Good apples in spoiled barrels: A temporal model of firm formalization in a field characterized by widespread informality. Journal of Business Venturing, 37(2), 106188. https://doi.org/10.1016/j.jbusvent.2021.106188

Chacaltana, J., Ruiz, C., & Vezza, E. (2022). E-formalización en América Latina: acelerando en una región llena de brechas. Lima: OIT, Oficina Regional para América Latina y el Caribe.

Chan Sánchez, J. J. APEC. De las metas de Bogor a la visión de Putrajaya 2040.

Chen, H., & Tian, Z. (2022). Environmental uncertainty, resource orchestration and digital transformation: A fuzzy-set QCA approach. Journal of Business Research, 139, 184-193.

Chen, L. (2020). Improving digital connectivity for e-commerce: A policy framework and empirical note for ASEAN.

Chen, L., Li, Y., & Fan, D. (2018). How do emerging multinationals configure political connections across institutional contexts?. Global Strategy Journal, 8(3), 447-470.

Chen, M., Bonner, C., & Carré, F. (2015). Organizing informal workers: Benefits, challenges and successes. Background Paper for Human Development Report.

Cling, J. P., Razafindrakoto, M., & Roubaud, F. (2012). To be or not to be registered? Explanatory factors behind formalizing non-farm household businesses in Viet Nam. Journal of the Asia Pacific Economy, 17(4), 632-652.

Coles, R. S., Sine, W., Brewer, J., & Dornisch, W. R. (2023). Size Matters: The Moderating Impact of Firm Size on Formalization and Performance for New Firms. In Academy of Management Proceedings (Vol. 2023, No. 1, p. 12679). Briarcliff Manor, NY 10510: Academy of Management.

Culot, G., Nassimbeni, G., Orzes, G., & Sartor, M. (2020). Behind the definition of Industry 4.0: Analysis and open questions. International Journal of Production Economics, 226, 107617.

Dannenberg, P., Braun, B., Kulke, E., 2016. The paradox of formalization and informalization in south-north value chains. DIE ERDE–J. Geogr. Soc. Berlin 147 (3), 173–186.

Darbi, W. P. K., Hall, C. M., & Knott, P. (2018). The informal sector: A review and agenda for management research. International Journal of Management Reviews, 20(2), 301-324.

Davidsson, P. (1989). Entrepreneurship—and after? A study of growth willingness in small firms. Journal of business venturing, 4(3), 211-226.

De Castro, J. O., Khavul, S., & Bruton, G. D. (2014). Shades of grey: how do informal firms navigate between macro and meso institutional environments?. Strategic Entrepreneurship Journal, 8(1), 75-94.

De Mel, S., McKenzie, D., & Woodruff, C. (2008). Returns to capital in microenterprises: evidence from a field experiment. The quarterly journal of Economics, 123(4), 1329-1372. https://doi.org/10.1162/qjec.2008.123.4.1329

De Mel, S., McKenzie, D., & Woodruff, C. (2011). What is the Cost of Formality? Experimentally estimating the demand for formalization. American Economic Journal: Applied Economics, 5(2), 1221-50.

De Paula, A., & Scheinkman, J. A. (2011). The informal sector: An equilibrium model and some empirical evidence from Brazil. Review of Income and Wealth, 57, S8-S26.

De Soto, H., Ghersi, E., & Ghibellini, M. (1987). El otro sendero.

Dell'Anno, R. (2010). Institutions and human development in the Latin American informal economy. Constitutional Political Economy, 21, 207-230.

Diao, X., Kweka, J., & McMillan, M. (2018). Small firms, structural change and labor productivity growth in Africa: Evidence from Tanzania. World Development, 105, 400-415.

Díaz, J. J., Chacaltana, J., Rigolini, I. P., & Ruiz Ortega, C. (2018). Pathways to formalization: going beyond the formality dichotomy--the case of Peru. World Bank Policy Research Working Paper, (8551).

Dieng, A. K. (2022). Formalization of Enterprises in Senegal, Benin and Burkina Faso: Segmentation Approach to Informal Entrepreneurs.

Divald, S. (2021). E-formalization case study: e-Estonia: a digital society for the transition to formality.

Dolgui, A., & Ivanov, D. (2022). 5G in digital supply chain and operations management: Fostering flexibility, end-to-end connectivity and real-time visibility through internet-of-everything. International Journal of Production Research, 60(2), 442-451.https://doi.org/10.1080/00207543.2021.2002969

Du, X., & Jiang, K. (2022). Promoting enterprise productivity: The role of digital transformation. Borsa Istanbul Review, 22(6), 1165-1181.

Dufour, J., & Son, P. E. (2015). Open innovation in SMEs–towards formalization of openness. Journal of Innovation Management, 3(3), 90-117.

Durst, S., Svensson, A., & Palacios Acuache, M. M. G. (2021). Peruvian small and medium-sized enterprises in times of crisis—Or what is happening over time?. Sustainability, 13(24), 13560.

Edelman, L. F., Brush, C. G., Manolova, T. S., & Greene, P. G. (2010). Start-up motivations and growth intentions of minority nascent entrepreneurs. Journal of small business management, 48(2), 174-196.

Fajnzylber, P., Maloney, W. F., & Montes-Rojas, G. V. (2011). Does formality improve micro-firm performance? Evidence from the Brazilian SIMPLES program. Journal of Development Economics, 94(2), 262-276.

Fields, G.S. (2009). Segmented labor market models in developing economies.

Floridi, A., Demena, B. A., & Wagner, N. (2022). A game worth the candle? Meta-analysis of the effects of formalization on firm performance. Journal of Developmental Entrepreneurship, 27(04), 2250026.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1),

Freeman, R. E. (1984). Strategic management: A stokcholder approach. Pitman.

Gaglio, C., Kraemer-Mbula, E., & Lorenz, E. (2022). The effects of digital transformation on innovation and productivity: Firm-level evidence of South African manufacturing micro and small enterprises. Technological Forecasting and Social Change, 182, 121785.

Gajigo, O., & Hallward-Driemeier, M. (2012). Why do some firms abandon formality for informality? Evidence from African economies. African Development Bank, Working Paper Series, 164.

Gallien, M., & Boogaard, V. V. D. (2023). Formalization and its Discontents: Conceptual Fallacies and Ways Forward. Development and Change. https://doi.org/10.1111/dech.12768

Gao, G. Y., J. Y. Murray, M. Kotabe and J. Lu (2010). 'A "strategy tripod" perspective on export behaviors: evidence from domestic and foreign firms based in an emerging economy', Journal of International Business Studies, 41, pp. 377–396.

García Zaballos, A., Iglesias Rodriguez, E., & Puig Gabarró, P. (2022). Informe anual del Índice de Desarrollo de la Banda Ancha: brecha digital en América Latina y el Caribe: IDBA 2021.

García-Zaballos, A., Huici, H., Puig Gabarró, P., & Iglesias Rodríguez, E. (2021). Cerrando la brecha de conectividad digital: Políticas públicas para el servicio universal en América Latina y el Caribe. Banco Interamericano de Desarrollo.

Gault, F., Arundel, A., & Kraemer-Mbula, E. (Eds.). (2023). Handbook of innovation indicators and measurement. Edward Elgar Publishing.

Gennaioli, N., Shleifer, A., & Vishny, R. W. (2013). A model of shadow banking. The Journal of Finance, 68(4), 1331-1363.https://doi.org/10.1111/jofi.12031

Gereffi, G., Humphrey, J., Sturgeon, T. (2005). The governance of global value chains. Rev. Int. Political Econ. 12 (1), 78–104. https://doi.org/10.1080/09692290500049805

Gindling, T.H., Newhouse, D., (2012). Self-Employment in the Developing World. The World Bank. https://doi.org/10.1016/j.worlddev.2013.03.003

Godfrey, P. C., & Dyer, G. (2015). Subsistence entrepreneurs and formal institutions: Semi-formal governance among Ghanaian entrepreneurs. In Management, society, and the informal economy (pp. 142-160). Routledge.

Granda-Carvajal, C., & García-Callejas, D. (2023). Informality, tax policy and the business cycle: exploring the links. International Tax and Public Finance, 30(1), 114-166.

Gutierrez, L. H., & Rodriguez-Lesmes, P. (2023). Productivity gaps at formal and informal microfirms. World Development, 165, 106205.

Gutierrez, L. H., & Rodriguez-Lesmes, P. (2023). Productivity gaps at formal and informal microfirms. World Development, 165, 106205.

Gutiérrez-Romero, R. (2021). Inequality, persistence of the informal economy, and club convergence. World Development, 139, 105211.

Hafner-Burton, E. M., & Schneider, C. J. (2019). The dark side of cooperation: International organizations and member corruption. International Studies Quarterly, 63(4), 1108-1121.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R: A workbook (p. 197). Springer Nature.

Hair, J. F., Jr., Sarstedt, M., Ringle, C. M.&, & Gudergan, S. P. (2017). ADVANCED ISSUES IN PARTIAL LEAST SQUARES STRUCTURAL EQUATION MODELING. Thousand Oaks, CA, USA: SAGE publications.

Hamilton, B. H., & Nickerson, J. A. (2003). Correcting for endogeneity in strategic management research. Strategic organization, 1(1), 51-78.

Han, H., & Ponce Cueto, E. (2016). Formalization of reverse logistics programs: A theoretical framework. Brazilian Journal of Operations & Production Management, 13(2).

Harris, J.R., Todaro, M.P., (1970). Migration, unemployment and development: A two-sector analysis. American Economic Review. 60 (1), 126–142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. The journal of modern African studies, 11(1), 61-89.

Hendy, R., & Zaki, C. (2013). On informality and productivity of micro and small enterprises: Evidence from MENA economies. International Journal of Entrepreneurship and Small Business, 19(4), 438-470.

Henseler, J., & Schuberth, F. (2020). Using confirmatory composite analysis to assess emergent variables in business research. Journal of Business Research, 120, 147–156. doi:10.1016/j.jbusres.2020.07.026.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2016). Testing measurement invariance of composites using partial least squares. International marketing review, 33(3), 405-431.

Heredia, J., McIntyre, J. R., Rubiños, C., Santibañez, E., & Flores, A. (2023). A configuration approach to explain corporate environmental responsibility behavior of the emerging economies firms at industry 4.0. Journal of Cleaner Production, 395, 136383.

Heredia, J., Rubiños, C., Vega, W., Heredia, W., & Flores, A. (2022). New strategies to explain organizational resilience on the firms, 14(3), 1612. https://doi.org/10.3390/su14031612

Heredia, J., Yang, X., Flores, A., Rubiños, C., & Heredia, W. (2020). What drives new product innovation in China? An integrative strategy tripod approach. Thunderbird International Business Review, 62(4), 393-409.

ILO (2015). R204 – Transition from the informal to the formal economy recommendation: Recommendation concerning the transition from the informal to the formal economy. International Labour Organisation. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---ifp_seed/documents/publication/wcms_768032.pdf

IMD - International Institute for Management Development (2023). IMD World Competitiveness Booklet 2023. Switzerland, June 2023. https://imd.cld.bz/IMD-World-Competitiveness-Booklet-2023/2/

Jones, T., Ram, M., & Edwards, P. (2006). Shades of grey in the informal economy. International journal of sociology and social policy, 26(9/10), 357-373.

Kanbur, R. (2017). Informality: Causes, consequences and policy responses. Review of Development Economics, 21(4), 939-961.

Khattak, A., Tabash, M. I., Yousaf, Z., Radulescu, M., Nassani, A. A., & Haffar, M. (2022). Towards innovation performance of SMEs: Investigating the role of digital platforms, innovation culture and frugal innovation in emerging economies. Journal of Entrepreneurship in Emerging Economies, 14(5), 796-811.

Kirkwood, J. (2009). To grow or not? Growing small service firms. Journal of Small Business and Enterprise Development, 16(3), 485-503.

Klapper, L., Miller, M., & Hess, J. (2019). Leveraging digital financial solutions to promote formal business participation.

Klein, V. B., & Todesco, J. L. (2021). COVID-19 crisis and SMEs responses: The role of digital transformation. Knowledge and Process Management, 28(2), 117-133. https://doi.org/10.1002/kpm.1660

Kogan PagPeng, Y., & Tao, C. (2022). Can digital transformation promote enterprise performance? From the perspective of public policy and innovation. Journal of Innovation & Knowledge, 7(3), 100198.

Korwatanasakul, U., & Hue, T. T. (2022). Global Value Chain Participation and Labour Productivity in Manufacturing Firms in Viet Nam: Firm-Level Panel Analysis. Economic Research Institute for ASEAN and East Asia.

Kouakou, D. C. (2023). Competing against 'invisibles': the effect of competition from informal firms on formal firms' R&D. Eurasian Business Review, 13(1), 87-117.

Kring, S., & Elder, S. (2022). Digital solutions and formalization: E-formalization case study on the Republic of Korea. ILO.

Kring, S., & Leung, V. (2021). Renewing the social contract through e-formalization in the world of work. Geneva: ILO.

La Porta, R., & Shleifer, A. (2014). Informality and development. Journal of economic perspectives, 28(3), 109-126.

Laguna, M., Hernández, I., & Godoy, J. M. (2023). Informality, economic complexity, and internalization of rules. Frontiers in Sociology, 8.

Laha, A. (2019). Interaction between the formal and informal financial sectors and its implications on monetary policy: Experiences from Indian economy. In: The Impacts of Monetary Policy in the 21st Century: Perspectives from Emerging Economies. EmeraldPublishing Limited.

Lavado, P. (2022). ¿Es posible la e-formalización en el Perú? Lima: OIT, Oficina Regional para América Latina y el Caribe.

Lay, J., & Tafese, T. (2020). Formalization and productivity.

León, J. (2023). Políticas públicas para la formalización del empleo en el Perú. Lima: Pontificia Universidad Católica del Perú.

Lewis, W.A., (1954). Economic development with unlimited supplies of labour. Manch. Sch. 22(2), 139–191.

Li, S., & Tian, Y. (2023). How Does Digital Transformation Affect Total Factor Productivity: Firm-Level Evidence from China. Sustainability, 15(12), 9575.

Loayza, N. (2008). Causas y consecuencias de la informalidad en Perú. Revista de Estudios Económicos, Banco Central de Reserva del Perú, 15, 45-64.

Loayza, N. (2018). Informality: why is it so widespread and how can it be reduced? World Bank Research and Policy Briefs, (133110).

Loayza, N. (2023). Cómo abordar la informalidad. Lima: Consorcio de Investigación Económica y Social (CIES).

Loayza, N., & Pennings, S. M. (2020). Macroeconomic policy in the time of COVID-19: A primer for developing economies. World Bank Research and Policy Briefs, (147291).

Luna-Reyes, L. F., & Gil-Garcia, J. R. (2014). Digital government transformation and internet portals: The co-evolution of technology, organizations, and institutions. Government information quarterly, 31(4), 545-555.

Luo, Q., Hu, H., Feng, D., & He, X. (2022). How does broadband infrastructure promote entrepreneurship in China: Evidence from a quasi-natural experiment.

Telecommunications Policy, 46(10), 102440. https://doi.org/10.1016/j.telpol.2022.102440

Luo, Q., Hu, H., Feng, D., & He, X. (2022). How does broadband infrastructure promote entrepreneurship in China: Evidence from a quasi-natural experiment. Telecommunications Policy, 46(10), 102440. https://doi.org/10.1016/j.telpol.2022.102440

Luo, Y. (2022). A general framework of digitization risks in international business. Journal of international business studies, 53(2), 344-361.

Lynn, T., Rosati, P., Conway, E., Curran, D., Fox, G., & O'Gorman, C. (2022). Infrastructure for Digital Connectivity. In Digital Towns: Accelerating and Measuring the Digital Transformation of Rural Societies and Economies (pp. 109-132). Cham: Springer International Publishing.

Lyu, X., Ma, J., & Zhang, X. (2023). Social trust and corporate innovation: An informal institution perspective. The North American Journal of Economics and Finance, 64, 101829.

Maloney, W. F. (1999). Does informality imply segmentation in urban labor markets? Evidence from sectoral transitions in Mexico. World Development, 27(1), 185-203. doi:10.1016/S0305-750X (98)00123-4.https://doi.org/10.1093/wber/13.2.275

Maloney, W. F. (2004). Informality revisited. World development, 32(7), 1159-1178.

Mbaye, A. A., Golub, S., & Gueye, F. (2020). Formal and informal enterprises in francophone Africa: Moving toward a vibrant private sector. IDRC, Ottawa, ON, CA.

McKenzie, D. J., & Woodruff, C. (2006). Do entry costs provide an empirical basis for poverty traps? Evidence from Mexican microenterprises. Economic development and cultural change, 55(1), 3-42.

Mendy, J., Rahman, M., & Singh, S. (2019). Application of PLS-SEM for small scale survey: an empirical example of SMEs. In 18th European Conference on Research Methodology for Business and Management Studies (p. 233).

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. Government information quarterly, 36(4), 101385.

Mishra, S., & Tripathi, A. R. (2020). Literature review on business prototypes for digital platform. Journal of Innovation and Entrepreneurship, 9(1), 1-19.

Moser, C.O. (1978). Informal sector or petty commodity production: Dualism or dependence in urban development? World Development 6 (9–10), 1041–1064.https://doi.org/10.1016/0305-750X(78)90062-1

Moyo, B. (2022). Factors affecting the probability of formalizing informal sector activities in Sub Saharan Africa: evidence from World Bank enterprise surveys. African Journal of Economic and Management Studies, 13(3), 480-507.

Mwombeki, F. (2023). What drives SME formalization in Tanzania? An assessment using the machine learning techniques. International Journal of Research in Business and Social Science (2147-4478), 12(1), 362-371.

Najib, M., & Kiminami, A. (2011). Innovation, cooperation and business performance: Some evidence from Indonesian small food processing cluster. Journal of Agribusiness in Developing and Emerging Economies, 1(1), 75-96.

Nguimkeu, P., & Okou, C. (2021). Leveraging digital technologies to boost productivity in the informal sector in Sub-Saharan Africa. Review of Policy Research, 38(6), 707-731.

Nguyen, T. P. T., Huang, F., & Tian, X. (2021). A meta-analysis of the impact of open innovation on performance. Journal of Management & Organization, 1-18.

Nguyen, T., Verreynne, M. L., & Steen, J. (2014). Drivers of firm formalization in Viet Nam: an attention theory explanation. Entrepreneurship & Regional Development, 26(7-8), 574-593. https://doi.org/10.1080/08985626.2014.959069

Nohoua, T. (2021). Business environment effect on formalization willingness and registration decision of SMEs in Ivory Coast. The Journal of Applied Business and Economics, 23(5), 11-29.

Nohoua, T. (2023). Understanding the Theoretical Foundations Underlying the Formalization of the Informal Economy. The Journal of Applied Business and Economics, 25(2), 98-111.

OIT. (2021). Formalización de empresas: Una Introducción. wcms_768032.pdf (ilo.org)

OIT. (2022). Beneficios de la formalización de un negocio. Lima: OIT, Oficina Regional para América Latina y el Caribe. https://www.ilo.org/lima/publicaciones/WCMS_845320/lang--es/index.htm

Olomi, D. R., Nchimbi, M. I., & Utouh, J. L. (2011). Explaining Business Formalization Processes With a Gender Perspective. In ICSB World Conference Proceedings (p. 1). International Council for Small Business (ICSB).

Patel, P. C. (2011). Role of manufacturing flexibility in managing duality of formalization and environmental uncertainty in emerging firms. Journal of Operations Management, 29(1-2), 143-162.

Peng, M. W., Wang, D. Y., & Jiang, Y. (2008). An institution-based view of international business strategy: A focus on emerging economies. Journal of international business studies, 39, 920-936.

Peng, Y., & Tao, C. (2022). Can digital transformation promote enterprise performance?—From the perspective of public policy and innovation. Journal of Innovation & Knowledge, 7(3), 100198.

Peña, J., Flores, A., & Heredia, J. (2023). Exploring the Influence of Digitalization on the Formalization Process of Informal Businesses: Comparative Strategic Management in China and Peru. International Journal of Business Environment

Perkin, N., & Abraham, P. (2021). Building the agile business through digital transformation.

Perry, G., Maloney, W., Arias, O., Fajnzylber, P., Mason, A., Saavedra-Chanduvi, J., & Bosch, M. (2007). Informalidad: escape y exclusión. Estudios del Banco Mundial sobre América Latina y el Caribe, 1.

Piore, M.J., Sabel, C., (1984). The Second Industrial Divide: Possibilities for Prosperity. Basic book, New York.

Polese, A. (2023). What is informality? (mapping) in Eurasian spaces-and beyond. Eurasian Geography and Economics, 64(3), 322-364.

Porter, M. E. (1980). Industry structure and competitive strategy: Keys to profitability. Financial analysts journal, 30-41.

Portes, A., & Schauffler, R. (1993). Competing perspectives on the Latin American informal sector. Population and Development Review, 19(1), 33-60. https://doi.org/10.2307/2938384

Prasetyo, E. H. (2022). Legitimacy building of digital platforms in the informal economy: Evidence from Indonesia. Journal of Entrepreneurship in Emerging Economies, 14(6), 1168-1187. https://doi.org/10.1108/JEEE-02-2021-0073

Puffer, S. M., McCarthy, D. J., & Boisot, M. (2010). Entrepreneurship in Russia and China: The impact of formal institutional voids. Entrepreneurship theory and practice, 34(3), 441-467.

Puig, I. B. (2020). Desarrollo sostenible, transformación digital y atención a las personas: oportunidades y riesgos del envejecimiento demográfico. Relaciones Laborales y Derecho del Empleo.

Ramaswamy, V., & Ozcan, K. (2016). Brand value co-creation in a digitalized world: An integrative framework and research implications. International Journal of Research in Marketing, 33(1), 93-106.

Rand, J., & Torm, N. (2012). The benefits of formalization: Evidence from Vietnamese manufacturing SMEs. World development, 40(5), 983-998. https://doi.org/10.1016/j.worlddev.2011.09.004

Reece, B. (2006). E-government literature review. Journal of E-government, 3(1), 69-110.

Roberts, R. S. (1992). Groundwater management institutions. Groundwater exploitation in the High Plains. University Press of Kansas, Lawrence, KS, 88-109.

Rocha, L. A. (2021). The Covid-19 pandemic and its impact on the performance of firms:An analysis based on world bank microdata. The Journal of Developing Areas, 411–433. doi:10.1353/jda.2021.0072

Roxas, B., & Chadee, D. (2009). Impact of formal institutional environment on innovativeness and performance of SMEs in the Philippines. School of Management and Marketing the University of Southern Queensland, Queensland, Australia.

Roy, P., & Khan, M. H. (2021). Digitizing taxation and premature formalization in developing economies. Development and Change, 52(4), 855-877.

Salinas, A., Ortiz, C., Changoluisa, J., & Muffatto, M. (2023). Testing three views about the determinants of informal economy: New evidence at global level and by economy groups using the CS-ARDL approach. Economic Analysis and Policy, 78, 438-455.https://doi.org/10.1016/j.eap.2023.03.016

Schneider, F. (2005). Shadow economies around the world: What do we know? European Journal of Political Economy, 21(3), 598-642.http://dx.doi.org/10.2139/ssrn.518526

Schwertner, K. (2017). Digital transformation of business. Trakia Journal of Sciences, 15(1), 388-393.

Shahid, M. S., Shehryar, H., & Allibhoy, M. A. (2016). 29 Levels of informality and characteristics of micro-entrepreneurs in Pakistan. Routledge Handbook of Entrepreneurship in Developing Economies.

Shamsuzzoha, & Tanaka, M. (2021). Formalization of manufacturing firms in Bangladesh. Review of Development Economics, 25(3), 1668-1694.

Shtal, T. V., Hasanov, E. L., Ukubassova, G. S., Kozhabaeva, S. A., & Polyakova, Y. O. (2018). Formalization of the enterprise international economic activity efficiency management. Utopía y praxis latinoamericana: revista internacional de filosofía iberoamericana y teoría social, (82), 64-82.

Silupu, B., Usero, B., & Montoro-Sanchez, A. (2022). The transition toward the business formality of the Peruvian MSEs: How does the perception of entrepreneurs and the sector influence? Academia Revista Latinoamericana de Administración, 35(1), 100-114. https://doi.org/10.1108/ARLA-05-2021-0106

Solow, R. M. (1956). A contribution to the theory of economic growth. The quarterly journal of economics, 70(1), 65-94.

StatsAPEC. (2023). Recuperado de https://www.statistics.apec.org/

Strusani, D., & Houngbonon, G. V. (2020). What COVID-19 means for digital infrastructure in emerging markets. http://dx.doi.org/10.18235/0002352

Taiwo, O., (2013). Employment choice and mobility in multi-sector labour markets: Theoretical model and evidence from Ghana. Int. Labour Rev. 152 (3–4), 469–492. https://doi.org/10.1111/j.1564-913X.2013.00189.x

Taymaz, E. (2009). Informality and productivity: Productivity differentials between formal and informal

Tokman, V. E. (1978). Growth and informality in the labor markets of Latin America. Economía, 1(2), 1-42.

Tokman, V.E. (1988). Urban employment: Research and policy in Latin America. CEPAL Rev.

Traore, N. (2021). Informal entrepreneurial formalization for migrants: Determinants and effects on jobs creation in Côte d'Ivoire. Nohoua TRAORE (2021) Informal Entrepreneurial Formalization for Migrants: Determinants and Effects on Jobs Creation in Côte D'ivoire, International Journal of Small Business and Entrepreneurship Research, 9(1), 37-53.

Twigg, D. E., Kutzer, Y., Jacob, E., & Seaman, K. (2019). A quantitative systematic review of the association between nurse skill mix and nursing-sensitive patient outcomes in the acute care setting. Journal of advanced nursing, 75(12), 3404-3423.

Ulyssea, G. (2020). Informality: Causes and consequences for development. Annual Review of Economics, 12, 525-546. https://doi.org/10.1146/annurev-economics-082119-121914

Van, H. T., Kim, B., Lee, S. Y., & Gim, G. Y. (2019, July). The difference of intention to use E-government based on culture between Viet Nam and Korea. In 2019 20th IEEE/ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD) (pp. 409-420). IEEE.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of business research, 122, 889-901.

Vial, G. (2021). Understanding digital transformation: A review and a research agenda. Managing digital transformation, 13-66.

Vorisek, D., Kindberg-Hanlon, G., Koh, W. C., Okawa, Y., Taskin, T., Vashakmadze, E., & Ye, L. S. (2022). Informality in emerging market and developing economies: regional dimensions.

Vuletin, G. (2008). Measuring the informal economy in Latin America and the Caribbean.

Weng, DH, Lee, SH y Yamakawa, Y. (2021). Es hora de cambiar de carril: cómo las reformas promercado afectan la velocidad de formalización de las empresas informales. Diario de estrategia global , 11 (4), 767-795.

Widya-Hasuti, A., Mardani, A., Streimikiene, D., Sharifara, A., & Cavallaro, F. (2018). The role of process innovation between firm-specific capabilities and sustainable innovation in SMEs: Empirical evidence from Indonesia. Sustainability, 10(7), 2244.

Williams, C. C. (2015). Tackling entrepreneurship in the informal sector: An overview of the policy options, approaches and measures. Journal of Developmental Entrepreneurship, 20(01), 1550006.

Williams, C. C. (2023a). Formalization of the Informal Economy: An E-Government Approach. Springer Nature.

Williams, C. C. (2023b). Theorising an E-government Approach Towards Formalising the Informal Economy. In Formalization of the Informal Economy: An e-Government Approach (pp. 21-56). Cham: Springer Nature Switzerland.

Williams, C. C., & Horodnic, I. A. (2016). Cross-economy variations in the participation of small businesses in the informal economy: An institutional asymmetry explanation. Journal of Small Business and Enterprise Development, 23(1), 3-24.

Williams, C. C., & Nadin, S. (2010). Entrepreneurship and the informal economy: An overview. Journal of Developmental Entrepreneurship, 15(04), 361-378.

Williams, C. C., Shahid, M. S., & Martínez, A. (2016). Determinants of the level of informality of informal micro-enterprises: Some evidence from the city of Lahore, Pakistan. World Development, 84, 312-325.https://doi.org/10.1016/j.worlddev.2015.09.003

Williams, CC y Nadin, S. (2013). Aprovechar la cultura empresarial oculta: apoyar la formalización de la creación de empresas no registradas. Revista de desarrollo empresarial y de pequeñas empresas, 20 (2), 434-447.

Zhang, J., Long, J., & von Schaewen, A. M. E. (2021). How does digital transformation improve organizational resilience? —findings from PLS-SEM and fsQCA. Sustainability, 13(20), 11487.

Zietsma, C., Groenewegen, P., Logue, D. M., & Hinings, C. R. (2017). Field or fields? Building the scaffolding for cumulation of research on institutional fields. Academy of management annals, 11(1), 391-450.

Zylfijaj, K., Nikoloski, D., & Tournois, N. (2020). The impact of the business environment on the formalization of informal firms. The case of Kosovo. Comparative Southeast European Studies, 68(4), 505-529.