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Intention to Adopt Digital Technology in Businesses: Promoted by Early and Recent Digitalization and Embedded in Societal and Temporal Contexts

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Abstract. How, in a business, is intention to adopt digital technology shaped by early and recent digitalization and by embeddedness in socio-temporal contexts? A representative sample of 8,031 businesses in Spain and non-European Colombia, Egypt, Iran, Israel, Morocco, Sudan, Turkey, and United Arab Emirates, was surveyed in 2021. Intention to adopt digital technology is promoted by past digitalization, especially digitalization during the pandemic, coupled with pursuit of opportunities emerging with the pandemic. Non-European societies have been catching up during

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the pandemic and high intention to adopt digital technology may position them to forge ahead. Findings contribute to accounting for digitalization as an ongoing process in which past digitalization begets intention to adopt new technology. Findings contribute to understanding the coupling of digitalization with motives for businesses. Findings also account for embeddedness of digitalization in societal and temporal contexts, specifically the pandemic as an external enabler of digitalization for pursuing new opportunities.

Keywords: digitalization, adoption of technology, intention, opportunity, institutions, Covid-19.

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1. Introduction

A business may intend to adopt digital technology. It may adopt digital technology for the first time, or it may already have adopted such technology earlier. The business may experience a push, a pressure from competition, to digitalize. Or the business may experience a pull, a pull from a market where opportunities are likely to expand by digitalization. Thus, the motive of profit may promote digitalization. Or a motive of valuing newness may promote digitalization. Or the business may intend to digitalize because others have adopted digital technology that is thought to bring them competitive advantages. Conversely, the business may consider digital technology to be too risky, to be overly expensive, or to be unnecessary for its operations.

Research has focused on 'readiness' for adoption. Notably, human capital in the business entails a degree of readiness for adopting technology (Belitski and Liversage, 2019; Eller, Alford, Kallmünzer and Peters, 2020; Kraus, Jones, Kailer, Weinmann, Chaparro-Banegas and Roig-Tierno, 2021; Lee, 2001).

Digitalization is not only internally enabled, but also externally enabled by societal and temporal contexts. Digitalization of businesses began in advanced economies and diffused globally, but closely related to wealth of society (Cruz-Jesus, Oliveira, Bacao and Irani, 2017; World Bank, 2022). Less digitalized economies may be catching up, and some may even be forging ahead, while others may be falling behind (Samsami and Schøtt, 2022). Authorities around the world are promoting digitalization in business, in government, and in the population as a means to enhance wealth and well-being and are calling on management scholarship to devise ways to promote adoption and utilization (e.g., OECD, 2021; World Bank, 2016). Thus, governments and business organizations around the world, as societal contexts, are external enablers promoting digitalization. The pandemic, as a temporal context, has also been an external enabler for digitalization (Almeida, Duarte-Santos and Augusto-Monteiro, 2020; Amankwah-Amoah, Khan, Wood and Knight, 2021).

These developments raise the general question, what makes a business intend to adopt digital technology?

Digital technology differs from other technologies in that it quickly becomes obsolete (Rogers, 2003). Therefore, adoption of digital technology is perhaps a single adoption. Perhaps more often, adoption is serial or recurrent, and it may even be almost continuous. Thus, a business that has adopted technology, even recently, may intend to adopt more or newer technology in the near future. This raises a specific question, is adoption of digital technology promoting intention to further digitalization?

These considerations frame our research question, *in businesses, how is intention to adopt digital technology shaped by early and recent digitalization and by embeddedness in societal and temporal contexts?*

The question concerns digitalization as a process of change in businesses in the contexts of society and time, time of pandemic disruption and enablement. Accordingly, our perspective is historical (Wadhwani, Kirsch, Welter, Gartner and Jones, 2020). We address the question by a representative survey of businesses in several societies.

We find that intention to adopt digital technology is promoted by digitalization in the past, more by recent digitalization than by early digitalization, thus supporting the conception of digitalization as an ongoing process. Intention is also promoted by motives of accumulating wealth and making a difference in the world, but intention is hardly affected by motives of continuing a family tradition and of earning a living when jobs are hard to get.

Intention is shaped by the temporal context. Intention to digitalize has been promoted by the pandemic, in that digitalization is coupled with pursuit of new opportunities that have been emerging with the pandemic. This finding supports the view that the pandemic, despite its damaging disruption, has been an external enabler (Davidsson, Recker and Von Briel, 2021).

Intention is also shaped by the societal context. Early digitalization was far more prevalent in Spain than in the non-European societies. Recent digitalization, conversely, has been more widespread in the non-European societies. The non-European societies have been catching up to the level of digitalization in Spain. Intention to adopt digital technology is more pervasive in non-European societies, and they are thus posed to forge ahead. Intention to adopt digital technology is lower in Spain, and it is especially low among not-yet-digitalized businesses which thus tend to be falling behind. The businesses in Spain tend to be older and thus marked by inertia which makes them reluctant to adopt digital technology.

The findings make at least three distinct contributions. First, the findings enhance understanding of digitalization as an ongoing process in which past digitalization begets intention to adopt new digital technology. Second, findings establish a coupling of digitalization to motives for starting and running businesses. Third, findings account for embeddedness of digitalization in societal

and temporal contexts, specifically the pandemic as an external enabler of digitalization as a means for pursuing new opportunities.

The following first offers a theoretical perspective with hypotheses, then posits our research design, reports analyses, and finally discusses findings, contributions, and further research.

2. Theoretical Perspective and Hypotheses

2.1. Past Digitalization Affecting Intention

Strategically enterprising entrepreneurs are known to achieve performance-related outcomes such as innovation, exporting, and expectation for growth of their businesses. In particular, a business adopts digital technology to gain a competitive advantage (Leão and Da Silva, 2021; Futonge Nzembayie and Buckley, 2022), typically, and to enhance performance-related outcomes (Ferreira, Fernandes and Ferreira, 2019; Kraus et al., 2021; Lafuente, Acs, Sanders and Szerb, 2020), such as pursuit of new opportunities, in particular opportunities emerging with the pandemic (Davidsson et al., 2021), sustainability practice (George, Merrill and Schillebeeckx, 2021), innovation, export (Quarato, Pini and Positano, 2020), and growth (Bi, Davison and Smyrnios, 2017). The expected effects are that past digitalization promotes pursuit of new opportunity, sustainability practice, innovation, internationalization, and growth-expectation.

The obsolescence of past adoption of digital technology suggests that past digitalization begets future digitalization, making digitalization an ongoing and continuous process (Autio, Mudambi and Yoo, 2021). The effect of past digitalization on intention for future digitalization is illustrated in Figure 1, and here specified as a hypothesis:

Hypothesis 1: Past digitalization affects intention to digitalize. Specifically, adoption before and during the pandemic promotes intention (H1a); adoption only before the pandemic promotes intention (H1b); and adoption only during the pandemic promotes intention (H1c).

2.2. Motives Affecting Intention

Cultural values tend to be internalized by people and to become motives for starting and running an enterprise (Stam, Bosma, Van Witteloostuijn, De Jong, Bogaert, Edwards and Jaspers, 2012). An entrepreneur may have motives such as an aspiration to become wealthy (Weber, 2009), an ambition to make a difference in the world, a desire to continue a family tradition running businesses, and a wish

to earn a basic living through entrepreneurship, especially when jobs are difficult to get (Dencker, Bacq, Gruber and Haas, 2021). The entrepreneur's own values, capital and assessment of opportunities expectedly influence timing of digitalization in the business (Solberg, Traavik and Wong, 2020), as represented in Figure 1. Values of aspiration for wealth and ambition to make a difference are motivating pursuit and exploitation of entrepreneurial opportunity, for personal gain and social impact (Gorgievski, Ascalon and Stephan, 2011). Conversely, values of family tradition and earning a living are less focused on opportunity. This theoretical argument leads us to hypothesize the following:

Hypothesis 2: Motives for the business affects intention to digitalize. Specifically, a motive of accumulation of own wealth promotes intention (H2a); a motive of earning a living, as jobs are scarce, hardly promotes intention (H2b); a motive of making a difference in the world promotes intention (H2c); and a motive of continuing a family tradition hardly promotes intention (H2d).

2.3. Temporal Contextualization: Pandemic

Digitalization in businesses is embedded in a context of time. Time has obviously been an important context in the form of the pandemic. The pandemic has been an external enabler promoting digitalization. Focus has been on the digitalization as a means to survival of businesses during the pandemic. But the pandemic has also entailed emergence of new opportunities that entrepreneurial businesses may pursue. We theorize that digitalization is not merely a defensive tool for survival, but is also a means for pursuing new opportunities arising with the pandemic. We posit this as a hypothesis:

Hypothesis 3: Intention to digitalize is coupled with pursuit of new opportunities emerging with the pandemic.

2.4. Societal Contextualization: Spain and Non-European Societies

Digitalization in businesses is also embedded in a context of society and its institutions that channel, empower and constrain endeavors. This entails differences in adoption of technology from society to society around the world. As digitalization began in the advanced economies, e.g., in Spain, and then diffused around the world where societies may be trying to catch up, it would be worthwhile distinguishing between advanced European societies and less advanced non-European societies. We venture to hypothesize that a process of catching up is unfolding in non-European societies, and that intention is higher in these societies. We state this as a hypothesis:

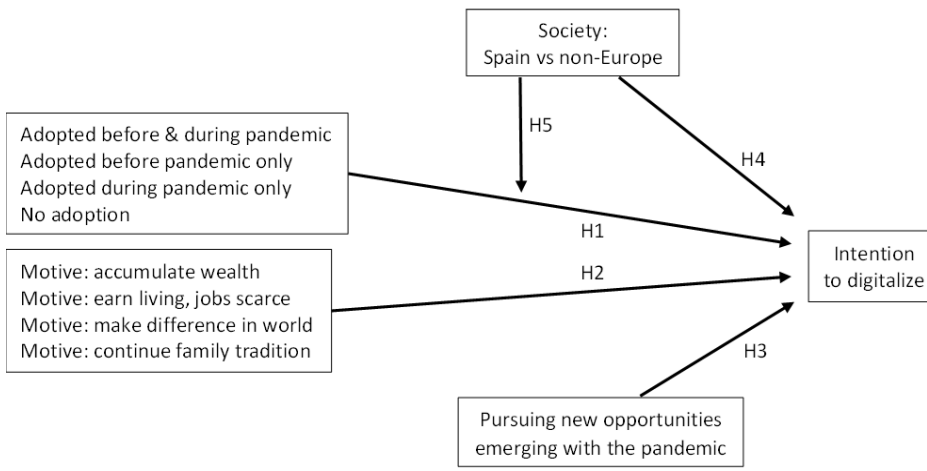
Hypothesis 4: Societies differ in intentions. Specifically, intention is higher in non-European societies than in Spain.

Advanced economies tend to have stronger and more effective and efficient institutions, especially formal institutions supporting a market economy, than emerging and less advanced economies where institutions are weaker, and in the extreme may have an institutional void. Concretely, digitalization occurs in a digital eco-system, that typically is more elaborate in advanced economies than in emerging economies (Song, 2019; Sussan and Acs, 2017). Therefore, we should expect digitalization to be more ongoing and continual in advanced economies than in emerging economies. More concretely, we expect past digitalization to be promoting intention to adopt with an effect that is stronger in advanced economies than in emerging economies. We state this as our last hypothesis:

Hypothesis 5: Societies differ in effects of past digitalization on intention. Specifically, effect of adoption before & during pandemic is lower in non-European societies than in Spain (H5a); effect of adoption before pandemic is lower in non-European societies than in Spain (H5b); and effect of adoption during pandemic is lower in non-European societies than in Spain (H5c).

These hypotheses are represented in the causal model in Figure 1.

Figure 1. Hypothesized effects



3. Research Design

Our ideas concern behavior of businesses in their contexts of society and time, specifically the pandemic. Therefore, we study businesses around the world

during the pandemic. We are able to use much of the survey conducted in 2021 by the Global Entrepreneurship Monitor, GEM (Global Entrepreneurship Monitor, 2022). GEM has scheduled to make the individual-level data from all forty-seven countries surveyed in 2021 available to members in 2023, and to the public in 2025 on the website www.gemconsortium.org.

3.1. Hierarchical Design: Businesses in Societies

The design is hierarchical in that we analyze businesses nested within societies, with effects on behavior from both society and background of the businesses. We are able to utilize the GEM survey of businesses as conducted in Spain and in eight non-European countries, Colombia, Egypt, Iran, Israel, Morocco, Sudan, Turkey, and the United Arab Emirates (digitalization in Spain is described by Calvo, Schøtt, Fernández-Laviada, Samsami and Barros, 2022; digitalization in the non-European societies is described by Tolba and colleagues (Tolba et al., 2022).

We compare businesses in Spain to businesses in these eight non-European countries, and we draw conclusions about differences between Spain and these non-European societies. But we cannot with confidence generalize to draw conclusions about European versus non-European societies. Rather, we compare Spain with the eight non-European societies for exploring and suggesting differences between advanced and emerging societies.

In each country, the survey randomly sampled adults and asked whether they own and manage a starting or operating business. This sampling yielded a sample of 8,031 businesses, described in Table 2. The randomness of sampling implies that findings can be generalized to the business in Spain and the eight non-European countries.

3.2. Measurements

The GEM survey asks questions, for each sampled business, about past adoption and about intention to adopt in the near future, as listed in Table 1.

The other conditions of interest are the four motives and the pursuit of new opportunities emerging with the pandemic. These are measured in the survey, as also listed in Table 1.

Table 1. Variables based on the GEM survey in 2021

Variable in analyses	**Questionnaire item**	**Coding**
Intention	Do you expect your business will use more digital technologies to sell your product or service in the next six months?	1 if intending to not adopt 2 if intending to perhaps adopt 3 if intending to adopt
Adoption: - before & during, or - before only, or - during only, or - no adoption	In response to the coronavirus pandemic, has your business made any changes in its use of digital technologies for selling your product or service? Yes – you enhanced by adopting new/improved digital technologies. No – you had already adopted a range of digital technologies before the coronavirus pandemic. Yes – you adopted digital technologies for the first time. No – your business can function without digital technologies	Three dichotomous variables are used for multivariate modeling: - 1 if before & during; 0 if not - 1 if before only; 0 if not - 1 if during only; 0 if not 'No adoption' is the reference
Motive: - Accumulate wealth - Earn a living - Make a difference - Family tradition	Please tell me the extent to which each of the following statements reflect the reasons you are involved in this business. To build great wealth or a very high income. To earn a living because jobs are scarce. To make a difference in the world. To continue a family tradition.	Four scaled variables: Likert scale 1 to 5 Likert scale 1 to 5 Likert scale 1 to 5 Likert scale 1 to 5
Pursuing new opportunities emerging in the pandemic	The coronavirus pandemic has led to new business opportunities that are being pursued in your business.	Likert scale 1 to 5
Sector - extractive - transformative - business services - consumer-oriented	What kind of business is this? Open-ended answers were classified into four categories.	4 categories, coded as dummies: 1 if extracting; 0 if not 1 if transforming; 0 if not 1 if business services; 0 if not 1 if consumer-oriented; 0 if not
Age of business	What was the first year founders of the business received wages, profits, or payments in kind from this business?	Numerical, year of survey minus year of first wages.
Owners	How many people, including yourself, will both own and manage this new business?	Numerical, count of owners
Employees	Not counting the owners, how many people are currently working for this business?	Numerical, count of employees
Gender	What is your gender?	1 if male; 0 if female
Age	What is your current age (in years)?	Numerical, count of years
Education	What is the highest level of education you have completed?	Recoded as number of years
Self-efficacy	You personally have the knowledge, skill and experience required to start a new business.	Likert scale 1 to 5
Opportunity-assessment	In the next six months, there will be good opportunities for starting a business in the area where you live.	Likert scale 1 to 5
Risk-willingness	You would not start a business for fear it might fail.	Likert scale 1 to 5

Control variables should be included in the multivariate modeling which expectedly relate to the independent and dependent variables of interest. Expectedly, business characteristics such as sector, age of business, size of the business in terms of owners and employees, and also characteristics of owner-managers such as gender, age, education and entrepreneurial competencies are related to the independent and dependent variables of interest. These are measured in the GEM survey (Bosma, 2013). The correlations in Table A2 (see Appendix) indicate that it is appropriate to include them as controls. Indeed, as it turns out, by far most of the control variables are affecting intentions (Table 6).

3.3. Techniques for Testing the Hypotheses

A first glance at intentions in businesses concerning to adopt digital technology or not can be obtained by tabulating percentages and other univariate statistics (Table 3). A first look at the association between intentions and past digitalization can be obtained by cross-tabulating intentions and past digitalization (Table 5).

The hypotheses all concern effects on intentions. To ascertain an effect, we hold other conditions constant in a multivariate model. The dependent variable, intention, is ordinal with three ordered levels, 'intending to not adopt', 'intending to perhaps adopt', and 'intending to adopt'. An appropriate model is an ordered logit regression. Alternatively, we might assume that intention is an interval variable (i.e., the difference between 'intending to not adopt' and 'intending to perhaps adopt' is assumed to be the same as the difference between 'intending to perhaps adopt' and 'intending to adopt'). If this scale is assumed, we may then model effects by multiple linear regression or hierarchical linear modeling (Snijders and Bosker, 2012). We use ordered logit regression (Tables 6 and 7), but also offer hierarchical linear modeling and linear regression modeling in Table A1 in the Appendix, leading to the same conclusions.

4. Results

This section reports analyses of, first, the background of the businesses; second, the association between past digitalization and intention to adopt digital technology; and third, the effects on intentions.

4.1. Background: Characteristics of the Businesses

The background of the businesses is briefly described by their characteristics, Table 2. Businesses in Spain differ from businesses in non-European societies in almost all respects.

Table 2. Characteristics of businesses in Spain and in non-European societies

	Spain	Non-European societies	Significance of difference
Sample size	3,929	4,102	
Motive: Accumulate wealth	2.6	3.8	***
Motive: Earn a living, as jobs are scarce	4.0	4.0	
Motive: Make a difference in the world	2.6	3.0	***
Motive: Continue a family tradition	2.2	2.9	***
Pursuit of new opportunity	2.3	2.8	***
Sector: Extraction	7%	10%	***
Sector: Transformation	19%	30%	***
Sector: Business services	31%	13%	***
Sector: Consumer-oriented	43%	46%	**
Age of business (years)			
median of years	5	1	
mean of logged count of years	1.8	.91	***
Owners			
median of owners	1	1	
mean of logged count of owners	.33	.47	***
Employees			
median of employees	0	1	
mean of logged count of employees	.61	.91	***
Gender of entrepreneur: Male	53%	67%	***
Age of entrepreneur (years)	47.5	36.8	***
Education (years)	12.3	13.4	***
Self-efficacy	4.0	4.2	***
Opportunity-assessment	2.7	3.4	***
Risk-willingness	3.2	3.4	***
Networking with starters	1.0	1.6	***

Note:
N=8,031.
† $p<0.10$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$ in test of difference

The background of businesses is described further by correlations (see Table A2 in the Appendix).

4.2. Association Between Past Adoption and Intention to Adopt

Before conducting statistical tests of effects upon intentions, we take a first look at intentions. First, we look at intentions, Table 3. Obviously, businesses in the non-European societies are much more likely than businesses in Spain to intend to adopt digital technology in the near future. We may immediately conceive of two plausible explanations this difference, catching up or forging ahead (Abramovitz, 1986). That is, a conceivable explanation is that the global

competition is pressuring businesses in non-European societies to catch up to businesses in European societies such as Spain. Or, also a plausible explanation, businesses in non-European societies are forging ahead of businesses in European societies, e.g. Spain, where businesses are older and full of inertia.

Table 3. Intentions to adopt or not

	Spain	**Non-European societies**
Intending to adopt	38%	58%
Intending to perhaps adopt	12%	13%
Intending to not adopt	50%	29%
Total	100%	100%

Note:
N=8,031.

To consider these two plausible explanations, we look at past digitalization, Table 4. Adoption before the pandemic was far more prevalent in Spain (24%+35% = 59%) than in the non-European societies (15%+20% = 35%). Conversely, however, adoption during the pandemic was more prevalent in the non-European societies (15%+33% = 48%) than in Spain (24%+16% = 40%). Thereby, their adoption became rather similar during the pandemic. That is, digitalization in the non-European societies caught up with digitalization in Spain. The greater intention in the non-European societies than in Spain thus indicates that they are likely to be forging ahead of Spain in the near future.

Table 4. Past adoption of digital technology

	Spain	**Non-European societies**
Adopted both before & during pandemic	24%	15%
Adopted before the pandemic only	35%	20%
Adopted during the pandemic only	16%	33%
Adopted	75%	68%
Not adopted	25%	32%
Total	100%	100%

Note:
N=7,392.

Association between past digitalization and intentions can be seen by cross-tabulation the two variables, Table 5.

First, we see that intention to adopt digital technology in the near future is actually quite high among those who have already adopted some digital technology, and especially high among those who have adopted recently. Moreover, we see that intention to adopt is higher in the non-European societies

than in Spain, also among those that have already adopted. That is, the non-European societies are not merely catching up, but are forging ahead of Spain.

The chance of intending is especially high among those in the non-European societies which have already adopted. The chance of intending if already digitalized is expressed as the odds ratio that is 2.33 (70%/30%) in the non-European societies. Conversely, the chance of intending if not yet digitalized is the odds ratio of .59 (37%/63%). Thus the odds of intending is thus far higher for businesses that have already digitalized than for businesses that have not yet digitalized. The ratio between the two odds is 3.9 (2.33/.59). This means that the already digitalized businesses have a odds of intending that is 3.9 times the odds of the not yet digitalized businesses. In other words, the already digitalized businesses have a much higher chance of intending than the not yet digitalized businesses. In yet other words, there is a considerable digital divide among businesses in the non-European societies.

The digital divide is actually even wider in Spain, where the odds ratio is even higher, 6.4, as calculated in Table 5.

Table 5. Intending to adopt, by past adoption

Spain	Adopted both before & during	Adopted before only	Adopted during only		Adopted	Not adopted
Intending to adopt	58%	28%	69%		47%	12%
Not intending to adopt	42%	72%	31%		53%	88%
Total	100%	100%	100%		100%	100%
				Odds of intending	0.89	0.14
				Odds ratio	6.4	

Non-European societies	Adopted both before & during	Adopted before only	Adopted during only		Adopted	Not adopted
Intending to adopt	75%	48%	81%		70%	37%
Not intending to adopt	25%	52%	19%		30%	63%
Total	100%	100%	100%		100%	100%
				Odds of intending	2.33	0.59
				Odds ratio	3.9	

Note:
N=7,392.

To summarize, intention to adopt is higher among businesses that have already digitalized (than among businesses that have not yet adopted), and

especially higher in the non-European societies. In Spain, more than in non-European societies, by far most non-adopters intend to continue their non-adoption and they are thus lagging behind.

4.3. Effects on Intentions

Finally, we now directly address our research question, how is intention to adopt digital technology shaped by early and recent digitalization and by embeddedness in societal and temporal contexts?

Effects on intention are tested by a multivariate model, Table 6, an ordered logit model with coefficients for testing effects, positive and negative coefficients somewhat like in the common linear or logistic regressions (VIFs are estimated in linear regressions to be between 1.05 and 1.64 indicating that multicollinearity is not a problem).

Hypothesis 1 posits that past digitalization affects intention to digitalize. Specifically, contrasted non-adoption, adoption before and during the pandemic promotes intention (H1a), adoption only before the pandemic promotes intention (H1b), and adoption only during the pandemic promotes intention (H1c). These three hypotheses are tested in model A. All three effects are positive, supporting H1. Moreover, recent adoption has a greater effect than early adoption. This shows that adoption tends to be a serial or recurring phenomenon, rather than a one-time event.

Hypothesis 2 states that motives for the business affects intention to digitalize. Specifically, a motive of accumulation of own wealth promotes intention (H2a), a motive of earning a living, as jobs are scarce, hardly promotes intention (H2b), a motive of making a difference in the world promotes intention (H2c), and a motive of continuing a family tradition hardly promotes intention (H2d). The four hypotheses are tested in model A. The motives of accumulation of wealth and of making a difference are promoting intention to digitalize, whereas the motives of earning a living and continuing a family tradition are hardly affecting intention, supporting H2.

Hypothesis 3 concerns the temporal contextualization in form of the pandemic, asserting that intention to digitalize is coupled with pursuit of new opportunities emerging with the pandemic. This hypothesis is tested in model A. Supporting H3, the positive coefficient shows that, indeed, the pandemic has been an enabler, promoting digitalization.

Hypothesis 4 concerns the societal context. Societies differ in intentions; specifically, intention is higher in non-European societies than in Spain. This is tested in model A by including a dummy for each non-European society, using Spain as the reference that each non-European society is compared to. The coefficient for Colombia is positive, meaning that intention to adopt is more prevalent among businesses in Colombia than among businesses in Spain

(controlling for other conditions). Likewise, intention to adopt is higher in Egypt, Iran, Israel, Morocco, Sudan, and the United Arab Emirates than in Spain. Intention in Israel and Turkey is not discernibly different from intention in Spain. In none of the non-European societies is intention lower than in Spain. This lends support for Hypothesis 4. The considerable homogeneity among the eight non-European societies justifies treating them as a group and comparing the group to Spain, as we do in model B. The positive coefficient for non-Europe in model B lends additional support for Hypothesis 4.

Hypothesis 5 claims that societies differ in effects of past digitalization on intention. Specifically, the effect of adoption before & during the pandemic is lower in non-European societies than Spain (H5a), the effect of adoption before the pandemic is lower in non-European societies than in Spain (H5b), and the effect of adoption during pandemic is lower in non-European societies than in Spain (H5c). The three hypotheses are tested in model C as the three interaction effects. The three interaction effects are all negative, supporting Hypothesis 3.

Table 6. Intention, affected by time of past digitalization

Model		**Ordered logit models**		
Specification		A	B	C
H1a	Adopted both before & during the pandemic	1.83 ***	1.81 ***	2.02 ***
H1b	Adopted before the pandemic, not during	.57 ****	.54 ***	.77 ***
H1c	Adopted during the pandemic, not before	2.07 ***	2.05 ***	2.26 ***
H2a	Motive: Accumulating wealth	.06 **	.03 †	.03 †
H2b	Motive: Earning a living, as jobs are scarce	.03 †	.05 *	.05 *
H2c	Motive: Making a difference in the world	.16 ***	.18 ***	.18 ****
H2d	Motive: Continuing a family tradition	-.01	.01	.00
H3	Pursuit of new opportunities	.15 ***	.16 ***	.15 ***
H4	Non-European societies (contrasted Spain)		.52 ***	.83 ***
H5a	Non-Europe * Adopted before & during pandemic			-.46 **
H5b	Non-Europe * Adopted before the pandemic			-.48 ***
H5c	Non-Europe * Adopted during the pandemic			-.37 *
Sector: Extraction		-.25 †	-.31 *	-.30 *
Sector: Transformation		-.11	-.15 †	-.15 †
Sector: Business services		.07	.04	.03
Age of business		-.24 ***	-.25 ***	-.25 ***
Owners		.13 *	.17 ***	.17 ***
Employees		.08 *	.07 **	.07 **
Gender of entrepreneur: Male		.01	.02	.02
Age of entrepreneur		-.01 †	-.01 *	-.01 *
Education		.01 †	.01	.01
Self-efficacy		.01	.02	.02
Opportunity-assessment		.06 **	.08 ***	.07 ***
Risk-willingness		.01	.01	.01
Networking with starters		.08 **	.09 **	.09 **
Society: Colombia		1.21 ***		

Society: Egypt	.70 ***		
Society: Iran	.25 *		
Society: Israel	-.13		
Society: Morocco	.59 ***		
Society: Sudan	.57 ***		
Society: Turkey	.22		
Society: United Arab Emirates	.64 ***		
Threshold: Intention to not adopt	1.82 ***	1.85 ***	2.01 ***
Threshold: Intention to perhaps adopt	2.47 ***	2.50 ***	2.66 ***

Note:
N=5,402.
† p<0.10; * p<0.05; ** p<0.01; *** p<0.001
For adoption, the reference is 'No adoption' that each type of adoption is compared to.
For Sector, the reference is the consumer-oriented sector that each other sector is compared to.
For Society in Model A, the reference is Spain, that each other society is compared to.

The above analysis revealed positive effects of all three types of adoption (i.e., both before & during; before; and during the pandemic) and negative effects of all three types of interactions. This justifies analyzing effects of adoption without distinguishing among types of adoption. This analysis is reported in Table 7.

Having adopted digital technology in the past promotes intention to adopt more digital technology in the near future, as shown by the positive coefficient in model A. This is consistent with the more detailed results in Table 6.

The effect of past adoption upon intention to adopt is weaker in the non-European countries than in Spain, as shown by the negative interaction effect in model B. This is consistent with the more detailed results in Table 6.

Table 7. Intending to adopt, affected by having adopted

Model		**Logistic regression**	
Specification		A	B
H1	Adopted (contrasted not adopted)	1.47 ***	1.73 ***
H4	Non-Europe (contrasted Spain)	.59 ***	.95 ***
H5	Non-Europe * Adopted		-.45 **
Motive: Accumulating wealth		.00	.00
Motive: Earning a living, as jobs are scarce		.05 *	.05 *
Motive: Making a difference in the world		.19 ***	.19 ***
Motive: Continuing a family tradition		.03	.03
Pursuit of new opportunities		.21 ***	.21 ***
Sector: Extraction		-.39 **	-.37 **
Sector: Transformation		-.25 **	-.25 **
Sector: Business services		-.05	-.07
Age of business		-.23 ***	-.23 ***
Owners		.19 **	.19 **
Employees		.08 *	.08 *

Gender of entrepreneur: Male	.05	.04
Age of entrepreneur	-.01 †	-.01 †
Education	.00	.00
Self-efficacy	.02	.02
Opportunity-assessment	.08 ***	.08 ***
Risk-willingness	.02	.02
Networking with starters	.14 ***	.14 ***
Intercept	-2.91 ***	-3.13 ***

Note:
N=5,402.
† p<0.10; * p<0.05; ** p<0.01; *** p<0.001
For Sector, the reference is the consumer-oriented sector that each other sector is compared to.

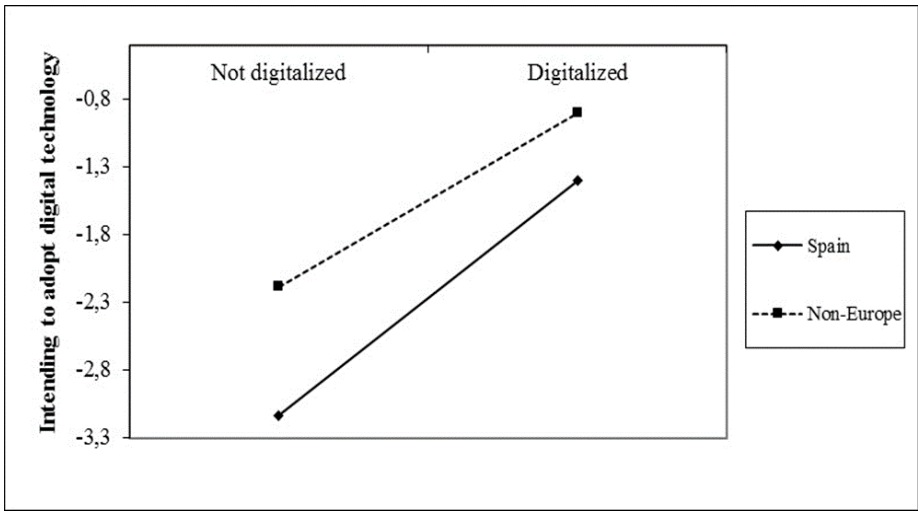
The above analysis uses ordered logit modeling because the dependent variable is ordinal. Assuming the dependent variable is interval scaled, or approximately interval scales, the analysis can be conducted by the more common linear regression or hierarchical linear modeling. These two alternative models yield results quite similar to those obtained by the ordered logit modeling, indicating robustness. These two alternatives are reported in the appendix.

4.4. Graphing Intention Affected by Past Adoption and Society

The effects on intention from past digitalization and from society were tested in Table 7 showing how the effect of past digitalization differs between Spain and the non-European societies. Using the estimates in Table 7, we can graph the effects, Figure 2.

The graph illustrates three conclusions drawn in Table 7, but not so obvious. First, intention to adopt digital technology is more prevalent in the non-European societies than in Spain, both among the already digitalized businesses and among the not-yet-digitalized businesses. Second, intention to adopt digital technology is more prevalent among the already digitalized businesses than among the not-yet-digitalized businesses, both in Spain and in the non-European societies. Third, the effect of digitalization on intention is weaker in the non-European societies than in Spain.

Figure 2. Intention, affected by past adoption and by society



In short, intention to adopt digital technology is promoted by digitalization in the past, especially recent digitalization. Intention is also promoted by motives of accumulating wealth and making a difference in the world, but intention is hardly affected by motives of continuing a family tradition and of earning a living when jobs are hard to get. Intention to digitalize has also been promoted by the pandemic, in that digitalization is coupled with pursuit of new opportunities that have been emerging with the pandemic.

5. Discussion

The above analyses address the question, *in businesses, how is intention to adopt digital technology shaped by early and recent digitalization and by embeddedness in societal and temporal contexts?* Here we discuss findings and their contribution and policy relevance, and also pinpoint limitations and suggest further research.

5.1. Findings

Intention to adopt digital technology is promoted by digitalization in the past, more by recent digitalization than by early digitalization, thus supporting the conception of digitalization as an ongoing process. Intention is also promoted by motives of accumulating wealth and making a difference in the world, but intention is hardly affected by motives of continuing a family tradition and of earning a living when jobs are hard to get.

Intention is shaped by the temporal context. Intention to digitalize has been promoted by the pandemic, in that digitalization is coupled with pursuit of new opportunities that have been emerging with the pandemic. This finding supports the view that the pandemic, despite its damaging disruption, has been an external enabler (Davidsson et al., 2021).

Intention is also shaped by the societal context. Early digitalization was far more prevalent in Spain than in the non-European societies. Recent digitalization, conversely, has been more widespread in the non-European societies. The non-European societies have been catching up to the level of digitalization in Spain. Intention to adopt digital technology is more pervasive in non-European societies, and they are thus posed to forge ahead. Intention to adopt digital technology is less in Spain, and is especially low among not-yet-digitalized business which thus tend to be falling behind. The businesses in Spain tend to be older and thus marked by inertia which makes them reluctant to adopt digital technology. These indications of global tendencies and trends are consistent with accounts of ICT use around the world (Karim, Nahar and Demirbag, 2022).

5.2. Contribution

The findings make at least three distinct contributions. First, the findings enhance understanding of digitalization as an ongoing process in which past digitalization begets intention to adopt new digital technology. Second, findings establish a coupling of digitalization to motives for starting and running businesses. Third, findings account for embeddedness of digitalization in societal and temporal contexts, specifically the pandemic as an external enabler of digitalization as a means for pursuing new opportunities.

5.3. Policy Relevance

Digitalization is well-known to be global but highly unequal. There is a digital divide among societies. But digitalization is commonly perceived to be beneficial and to be a means for creating competitive advantages, especially in economic and military spheres, and authorities are busy digitalizing all spheres of life. Despite the isomorphism of efforts to digitalize, we found that societies differ widely in intention of businesses to adopt digital technology, which is likely to entail that some societies will be forging ahead while other societies will be falling behind. These divergent scenarios are not well-known but are of course relevant for deciding and prioritizing policies for digitalization around the world (Hai, Van, and Thi Tuyet, 2021).

5.4. Limitations

Our finding that past digitalization promotes intention to adopt more digital technology highlights a limitation. While many digitalized businesses intend to adopt more in the near future, many others do not intend. A limitation is that we have not examined the process of formation of intentions to adopt or not adopt.

Another limitation is that we found a surprisingly large effect of the motive of 'wanting to make a difference in the world' upon intention, larger than any pecuniary motive. We have not been able to examine the mechanism underlying this effect, but merely speculate that it is about 'ambition' (Stam et al., 2012; Stam, 2021).

Yet another limitation concerns generalizability across societies. While it is a feat to obtain a survey of representative samples of businesses in nine societies, we cannot generalize from these nine societies to the world's societies. Moreover, we cannot test effects of institutions upon digitalization.

5.5. Further Research

The limitations in our study suggest further research in several directions. First, how are businesses forming intentions to adopt digital technology, or not? Second, how are motives for the business shaping motives for adopting digital technology? Third, is the global diffusion of digital technology an equalizing process, i.e., a process of catching up and convergence, or is it a process of divergence with a widening digital divide in humankind, where some societies are forging ahead whereas others are falling behind? (Agarwal and Audretsch, 2020).

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Appendix

Table A1. Hierarchical linear models and linear regression models; metric coefficients

Model		**Hierarchical linear models**			**Linear regression models**		
Specification		A	B	C	D	E	F
H1a	Adopted both before & during the pandemic	.72 ***	.72 ***	.82 ***	.72 ***	.72 ***	.82 ***
H1b	Adopted before the pandemic, not during	.20 ***	.20 ***	.28 ***	.20 ***	.20 ***	.28 ***
H1c	Adopted during the pandemic, not before	.78 ***	.78 ***	.92 ***	.78 ***	.78 ***	.91 ***
H2a	Motive: Accumulating wealth	.02 **	.02 **	.02 *	.02 **	.01	.01
H2b	Motive: Earning a living, as jobs are scarce	.01 †	.01 †	.01 †	.01 †	.02 *	.02 *
H2c	Motive: Making a difference in the world	.06 ***	.06 ***	.06 ***	.06 ***	.06 ***	.06 ***
H2d	Motive: Continuing a family tradition	-.01	-.01	-.01	-.01	.00	.00
H3	Pursuit of new opportunities	.05 ***	.05 ***	.05 ***	.05 ***	.06 ***	.06 ***
H4	Non-European societies (contrasted Spain)		.17	.32 *		.18 ***	.34 ***
H5a	Non-Europe * Adopted both before & during			-.23 ***			-.24 ***
H5b	Non-Europe * Adopted before only			-.15 **			-.17 **
H5c	Non-Europe * Adopted during only			-.26 ***			-.25 ***
Sector: Extraction		-.07	-.07	-.06	-.07	-.09 *	-.08 †
Sector: Transformation		-.04	-.04	-.05 †	-.04	-.06 *	-.06 *
Sector: Business services		.03	.03	.03	.03	.02	.01
Age of business		-.09 ***	-.09 ***	-.09 ***	-.09 ***	-.10 ***	-.10 ***
Owners		.05 *	.05 *	.05 *	.05 *	.06 **	.06 **
Employees		.03 *	.03 *	.03 *	.03 *	.03 *	.02 *
Gender of entrepreneur: Male		.01	.01	.01	.01	.01	.01
Age of entrepreneur		-.002	-.002	-.002	-.002	-.002 †	-.002 †
Education		.004 †	.004 †	.003 †	.004 †	.002	.002
Self-efficacy		.00	.00	.00	.00	.01	.01
Opportunity-assessment		.02 **	.02 **	.02 **	.02 **	.03 ***	.03 **
Risk-willingness		.00	.00	.00	.00	.00	.00
Networking with starters		.03 ***	.03 ***	.003 ***	.03 ***	.04 ***	.04 ***
Society: Colombia		.42 ***			.42 ***		
Society: Egypt		.26 ***			.26 ***		
Society: Iran		.04			.04		
Society: Israel		-.04			-.04		
Society: Morocco		.22 ***			.22 ***		
Society: Sudan		.20			.20 ***		
Society: Turkey		.07			.07		
Society: United Arab Emirates		.18 ***			.18 ***		
Country (grouping of businesses)		Yes	Yes	Yes			
Intercept		1.22 ***	1.22 ***	1.15 ***	1.22 ***	.09 ***	1.14 ***

Note:
N=5,402.
† p<0.10; * p<0.05; ** p<0.01; *** p<0.001
For adoption, the reference is 'No adoption' that each type of adoption is compared to.
For Sector, the reference is the consumer-oriented sector that each other sector is compared to.
For Society in Models A and D, the reference is Spain, that each other society is compared to.

Table A2. Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2	-.22																							
3	.12	.16																						
4	.16	-.17	-.31																					
5	-.20	.33	-.28	-.35																				
6	-.08	-.29	-.31	-.39	-.35																			
7	-.41	.21	-.02	-.10	.21	-.08																		
8	-.01	.01	-.04	-.02	.02	.03	.03																	
9	-.15	.26	.05	-.10	.17	-.11	.35	-.02																
10	-.20	.07	-.05	-.12	.10	.06	.14	.10	.18															
11	-.14	.26	.07	-.08	.20	-.17	.21	-.01	.29	.09														
12	-.05	-.05	-.06	-.04	.00	.10	.03	.01	-.01	.20	-.04													
13	-.13	-.02	-.04	.00	-.02	.06	.04	.00	.01	.08	-.01	-.18												
14	.21	.03	.08	.12	-.04	-.16	-.05	-.04	-.02	-.19	.06	-.17	-.30											
15	-.03	.03	.00	-.08	.05	.03	-.02	.03	.01	-.03	-.01	-.28	-.51	-.48										
16	.34	-.27	.05	.09	-.19	.05	-.25	.02	-.21	.01	-.21	.03	-.01	.05	-.05									
17	-.13	.12	.02	-.05	.08	-.05	.05	-.08	.09	.09	.08	.00	.06	-.05	.00	-.14								
18	-.15	.07	.05	-.03	.03	-.05	.10	-.04	.10	.14	.06	.01	.09	-.06	-.03	.23	.22							
19	-.14	.04	-.01	-.02	.03	.01	.13	.00	.01	.08	.03	.04	.08	.03	-.12	.02	.05	.11						
20	.43	-.21	.02	.10	-.18	.06	-.31	.00	-.18	-.06	-.19	.02	-.03	.08	-.05	.45	-.12	.00	-.01					
21	-.08	.15	.10	.04	.05	-.18	.11	-.15	.07	-.17	.15	-.14	-.09	.25	-.05	-.14	.07	.07	-.01	-.15				
22	-.07	.08	-.00	.01	.05	-.06	.10	.00	.10	.02	.06	-.04	.00	-.01	.03	-.07	-.02	.05	.08	-.04	.06			
23	-.26	.21	-.02	-.08	.17	-.06	.23	-.01	.22	.10	.27	.01	.02	-.01	.00	-.22	.07	.08	.10	-.16	.09	.20		
24	-.08	.04	.01	-.03	.03	-.01	.09	-.06	.00	-.08	.04	.00	-.01	.01	.01	-.05	-.04	-.02	.03	-.07	.05	.13	.08	
25	-.22	.21	.02	-.11	.16	-.07	.18	-.03	.17	.08	.19	-.02	.03	.00	-.01	-.19	.11	.11	.12	-.19	.13	.17	.25	.09

1 Spain (contrasted the non-European societies)
2 Intention
3 Adoption both before and during the pandemic
4 Adoption before the pandemic; not during
5 Adoption during the pandemic; not before
6 No adoption
7 Motive of accumulating wealth
8 Motive of earning a living, as jobs scarce
9 Motive of making a difference in the world
10 Motive of continuing a family tradition
11 Pursuit of new opportunities emerging with pandemic
12 Sector: Extracting
13 Sector: Transforming
14 Sector: Business services
15 Sector: Consumer-oriented
16 Age of the business (logged)
17 Owners (logged)
18 Employees (logged)
19 Gender of entrepreneur: Male
20 Age of entrepreneur
21 Education of entrepreneur
22 Self-efficacy
23 Opportunity-assessment
24 Risk-willingness
25 Networking with starters