



Latin America 4.0: The Digital Transformation in the Value Chain



The upcoming challenge for Latin American business

gA Center for Digital Transformation



The gA Center for Digital Business Transformation in Latin America

The gA Center for Digital Business Transformation in Latin America (CdBT), the business and strategy research center of Grupo ASSA, was established in 2013 to explore and study the impact of digital technologies on large companies in Latin America. In particular, the CdBT

has focused on how executives of the largest companies in the region, are tackling the challenges of the digital economy in terms of strategy formulation, business process reengineering, applications development, organizational redesign and change management.

We would like to thank the companies that agreed to be interviewed for this study, as well as our colleagues at gA from the different offices across the Americas for their work and support of this research.

The gA Center for
Digital Business Transformation officers:

Chairman:

Roberto Wagmaister, Founder & CEO

Executive Director:

Paul A. Dougall, VP Corporate Development

Academic Director:

Raul Katz, President of Telecom Advisory Services LLC; Adjunct Professor, Columbia Business School; Director, Business Strategy Research, Columbia Institute for Tele-Information



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Executive Summary

The purpose of this study has been twofold. First, we aimed to understand why the massive adoption of digital technologies by Latin American businesses had not yet yielded the expected regional productivity gains. Building on this diagnostic, we wanted to formulate a set of prescriptions that would help companies in the region accelerate their digital transformation and finally achieve efficiency and business expansion benefits. Along these lines, the study addressed five key issues:

- What is the level of digitization of production processes by industries in Latin America?
- Is the level of digitization of production processes homogeneous or are there leading and lagging sectors? What explains the different levels of digitization across industries and countries?
- What are the enablers and barriers faced by Latin American firms to assimilate digital technologies in production processes to yield productivity improvements?
- Are Latin American businesses ready to incur the much-needed digital transformation?
- What are the implications of these challenges for the management of Latin American companies?

The study was based on face-to-face interviews with executives from 75 Latin American large companies in Latin America conducted between June and August 2015, coupled with the analysis of micro-data of national industrial census conducted by the statistical agencies of several countries of the region.

We define **Digital Transformation** as the adoption of digital technologies across all stages of a business value chain (from the supply chain to manufacturing and distribution) with the purpose of increasing revenues and productivity. We believe that this remains the critical challenge for Latin America businesses in the coming years. The economic forecast for Latin America indicates that economic growth for 2015-2017 will reach at best a third of what it has been in the 2003-2012 period. To overcome this constraint on future economic growth, Latin America needs to tackle the industrial competitiveness and productivity challenge, through intense assimilation of digital technologies. However, so far, despite the extremely high adoption of digital technologies across industries, their contribution to aggregate productivity growth remains extremely low. According to our analysis, while the overall level of digital technology adoption across industries is high (reaching an average adoption index of 79.18 out of 100), its assimilation at the business process level is low.

This shortfall is explained by the limited accumulation of intangible capital, which is defined as the difference between the purchase price of digital technology and the value created once it has been productively assimilated by a business. In other words, to yield productivity improvements in Latin America, the adoption of digital technologies needs to be combined with the hard work of process retooling, organization restructuring, and human resource retraining.



This statement is consistent with our findings from company interviews. While most executives told us that they had already developed a vision and a digital strategy, they suggested that the level of company readiness to implement a successful digital transformation remains low relative to the challenge. With average digital readiness index of 46.56 (out of 100), Latin American companies exhibit a significant gap in capabilities to tackle their digital transformation. Barriers to digital transformation evoked in the course of the interviews range from limited capacity to retain talent to lack of top management engagement, and low cross-functional coordination. This hurdle is not homogeneous. In fact, the Life Sciences & Health Care, Consumer Goods, and Telecommunications, Transport & Logistics sectors appear to be better equipped to tackle the challenge than other industries. From a geographic standpoint, Colombian and Chilean businesses appear to be better prepared to tackle the digital transformation challenge.

So what needs to be done? What are the factors that facilitate the accumulation of intangible capital necessary to productively assimilate the spending in digital technologies in Latin America?

A comprehensive Digital Transformation program comprises the following building blocks:

- A clear vision and leadership from senior management combined with a buy-in from line executives, to create a “willingness to transform”;
- A roadmap that includes an agenda for all the potential digital transformation initiatives that will be needed over the next several years, planning for shorter, higher-impact project cycles, over a 3-5 year horizon;

- Articulation of clear goals in terms of savings to be realized from higher operational efficiencies, and incremental revenues to be achieved by increasing revenue through existing and new lines of business;
- Business Process digitization, required to rewire the underlying operating model designed to capture the benefits of the digital economy;
- The ability to align your staff with the new digital strategy, retooling your existing “talent infrastructure” and selectively bringing in the skills sets that will be needed to succeed;
- An Enterprise Architecture function capable of orchestrating the new technologies with the existing landscape of core applications, data and infrastructure.

The success of digital business transformation is contingent upon a carefully crafted strategy. A digital strategy focused on a single business area, such as Distribution, is not enough: digital strategy needs to be broad and overarching, with a corporate-wide vision of the competitive advantage to be achieved through digitization.

One of the biggest challenges faced by Latin American businesses has been to adequately measure the incremental economic value of digital transformation. Value Management has to be the starting point in a major transformation project: once the vision has been established, companies need to define a quantitative understanding of the potential impact of digital transformation.

As mentioned above, the approach to digital transformation is all encompassing, comprising not only the technology but also business operations and people.



Talent is the fundamental “infrastructure” required: People, more than any other resource is the key to a successful digital business transformation. New skills and capabilities are going to be needed to compete in the long-term, but the winners will be those firms that are successful in managing the convergence of strategy, new technologies, business processes and their human capital.

At the core of digital business transformation lies innovation, defined as the ability to rethink competitive strategy, including new products and services, new business models, and new processes. Innovation happens only when there is a context and the stimulus for employees to spend time and resources in the development of new products and services, new ways of doing things or creating new working environments. Innovation tools can be used to think about the impact of digital transformation on business and competitive environment in a structured way. For example, Design Thinking is a powerful methodology to provide an innovative approach to problem solving that combines empathy, creativity and rationality.

In sum, digital transformation is not for the faint of heart. Unless a company is born digital, the fundamental re-creation of an enterprise is an important process where business assumptions that were defined almost at the firm’s inception are put into question, and a new operating model is defined. Along these lines, imitation approaches that merely copy what industry leaders have done in other environments or geographies represent a dangerous path. Each company operating in particular competitive environments is a one-of-a-kind system that needs to find the approach to digitization that fits best. Therefore, the reinvention of the digital enterprise is unavoidable and requires considerable effort and management leadership. This task is not only necessary for the future of the business. The sooner Latin American enterprises tackle this challenge, the earlier our region will be ready to compete at parity with the industrialized world in the digital future. Delaying digital transformation of Latin American economies is not optional if we want to ensure our future growth.

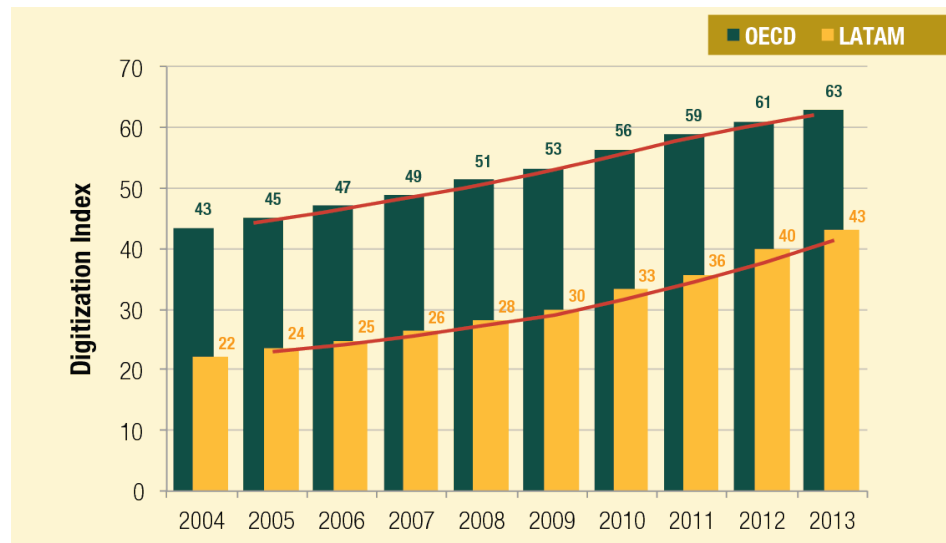


1. INTRODUCTION

There is a growing consensus that the digital transformation of the production or supply-side of the economy (sometimes called “Industrial Internet”) remains the critical challenge for Latin America in the coming years. Digital transformation is defined as the incorporation of digital technologies within all stages of a business value chain (from the supply chain to manufacturing and distribution) with the purpose of improving productivity, reducing costs and building competitive advantage through product differentiation.

In the past decade, the region has undergone a rapid adoption of digital technologies, which has fueled an increase in the digitization index¹ (see figure 1).

Figure 1. Latin America: Digitization Index (2004-2014)



¹The digitization index has been developed by Telecom Advisory Services to measure the adoption and usage of digital technologies. See Katz and Koutroumpis (2013), Katz, Koutroumpis and Callorda (2013), and Katz, Koutroumpis, and Callorda (2014). It is being used by the governments of Mexico, and Ecuador to measure progress in the implementation of their digital agendas.

Note: The OECD pro-rated average excludes Chile and Mexico, members of the OECD that are included in the Latin American average

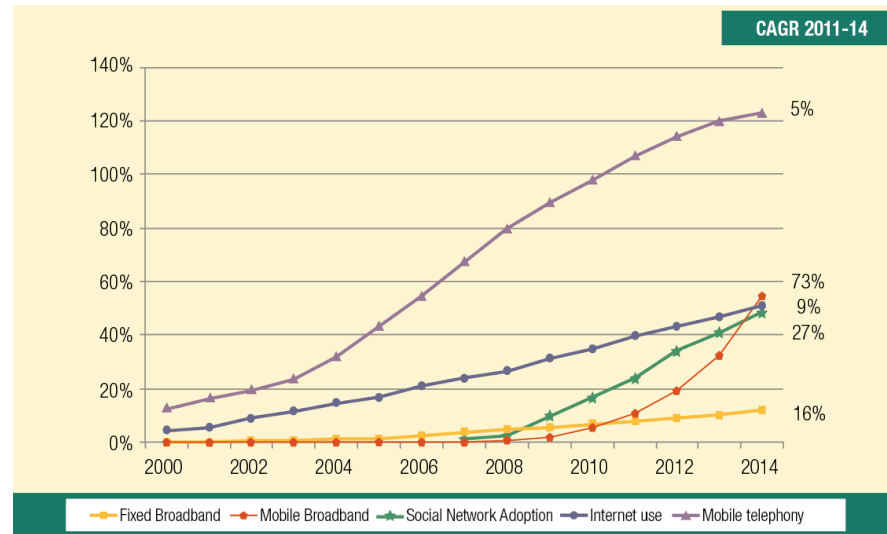
Source: Telecom Advisory Services analysis

As figure 1 indicates, while the gap separating Latin American from the OECD remains around 20 points, the rate of progress of digitization in the region is accelerating after 2009. In fact, as of 2015, six Latin American countries have already reached the advanced stage of digitization that characterizes industrial nations: Argentina, Chile, Costa Rica, Colombia, Panama, and Uruguay.



A large part of the growth in Latin American digitization has been driven by increased consumer adoption of digital technologies (see figure 2)

Figure 2. Adoption of Digital Technologies (2000-14)
(Percent of population)



Source: Katz (2015)

²See ECLAC (2015). The new digital revolution: from the consumer Internet to the industrial Internet. Santiago, Chile. Prepared for the fifth Ministerial Conference on the Information Society in Latin America and the Caribbean, held in Mexico City from 5 to 7 August 2015.

³ECLAC (2015). Social panorama of Latin America. Santiago, Chile.

⁴Calculated from ECLAC data in Katz (2015).

The explosive growth in mobile telephony, Internet usage, social networks, and mobile broadband is, in turn, the result of economic growth, income redistribution policies, and a decrease in digital technology prices². The combination of the first two factors has resulted in a dramatic reduction in poverty levels (from 43.6% of the population in 2002 to 28.0%³), while digital technology prices has declined significantly. For example, mobile broadband tariffs in the region have declined 52% rate since 2010 (Katz, 2014).

Looking forward, however, the economic forecast for Latin America is more challenging. The Economic Commission for Latin American and the

Caribbean (ECLAC) has projected a substantial deterioration of economic growth for 2015-2017, reaching at best a third of what it had been in the 2003-2012 period. A large portion of the past growth was driven by strong commodity prices, a cycle that has come to a close. In this context, in order to overcome this constraint on economic growth, Latin America needs to tackle the competitiveness and productivity challenge. The contribution of total factor productivity (TFP) to economic growth for Argentina, Brazil, Chile, Colombia, and Mexico between 1995 and 2012 has been negative: -1.26 percentage points⁴.



This drop in the contribution of TFP to economic growth has been partly compensated by the positive impact of information and communication technologies (ICT) capital, but this has not been enough to drive an increase in overall productivity.

In general terms, productivity growth is associated in part with the intensive usage of digital technologies in production processes, entailing not only digital distribution but also automation of the supply chain, and manufacturing processes. Recognizing this need, several national initiatives have been launched around the world to foster development of the “industrial Internet”⁵. However, the situation in Latin America does not yet reflect an awareness of the urgency of this endeavor. In fact, despite the increase in ICT investment, researchers still cannot detect a significant increase in productivity in important sectors of the economy, such as manufacturing, trade and mining⁶.

The purpose of this study is to understand first, why the impact of digital technologies has not yet yielded the expected productivity gains in Latin America, and secondly, to formulate a set of prescriptions that would help companies accelerate their digital transformation. Five key issues will be addressed:

- What is the level of digitization of production processes by industries in Latin America?
- Is the level of digitization of production processes homogeneous or are there leading and lagging sectors? What explains the different levels of digitization across industries and countries?
- What are the enablers and barriers faced by Latin American firms to assimilate digital technologies in production processes to yield productivity improvements?
- Are Latin American businesses ready to incur the much-needed digital transformation?
- What are the implications of these challenges for the management of Latin American companies?

⁵See for example, Germany Trade and Invest. Industrie 4.0: Smart manufacturing for the future, the Industrial Internet Consortium in the United States, and Ministry of Industry and Information Technology. Made in China 2025.

⁶See Katz (2015). Op. cit. p. 143.

The study is based on analysis of micro-data of national industrial census conducted by the statistical agencies of several countries of the region and more than 70 face-to-face interviews of executives from Latin American companies.

The study begins in chapter 2 by outlining the overall study thesis: what are the challenges faced by Latin America companies to transform themselves and incorporate digital technologies in their operating models.



In this context, chapter 3 presents the results of our analysis of national industrial census. Chapter 4 relies on industrial survey data to identify which countries and sectors are leading the process of digital transformation and who are lagging.

Chapters 5 and 6 present the results of our industry survey of Latin American companies, depicting not only what is the current situation in terms of digital transformation, but also what are the current obstacles they need to overcome to accelerate this process. These chapters set the stage to outline in chapter 7 of a set of prescriptions for Latin American companies for overcoming the challenges identified before.





2. THE DIGITAL CHALLENGE FACING LATIN AMERICAN COMPANIES

Digitization is having a fundamental impact on the way businesses compete and create value. Companies in Latin America are facing the challenge of how to tackle their digital transformation. Old operating models, prevalent in the region, are not viable any more, even after acquiring state-of-the-art digital technologies. Robert Solow's original dictum that "computers can be seen everywhere but in the productivity numbers" is particularly applicable to our region.

A number of explanations formulated to understand Solow's productivity paradox may ring a familiar bell to Latin American managers and policy makers. First, in the initial process of digitization, technologies are used for applications that have little impact on overall productivity. Second, there are substantial inefficiencies arising from running manual paper-based and computerized processes in parallel, usually resulting in two separate work-streams. Third, in many cases the adoption of digital technologies has been driven by technological progress (e.g. memory and processing capacity, bandwidth), rather than user capacity to assimilate them in a productive fashion. We believe, following the experience of the industrialized world, that the real digital transformation in the production side of the economy can only be achieved if, in order to

assimilate digital technologies, companies reengineer their operations, change their organization structures, and transform their business culture, allowing them to attract, and retain the talent.

Let's explore the research evidence generated so far that substantiates these statements. Economic research conducted in Latin America has concluded that despite the increase in digital technology spending, productivity and competitiveness remain elusive. For example, Cimoli and Correa (2010), researchers at the Economic Commission for Latin America and the Caribbean, have found that despite the positive correlation detected between ICT spending and productivity, the relation is not linear. In particular, they point out that four factors appear to influence the impact of ICT on productivity: a country's production structure, income distribution, the national innovation system, and the organization structure of companies and institutions. Balboni, Rovira and Vergara (2011) go further and they stipulate, based on research in Argentina, Chile, Colombia, Peru and Uruguay, that factors influencing the contribution of ICT include the quality of human capital, innovation capability, and organizational change. Finally, Molina, Rotondo and Yoguel (2011)

⁷See Solow, R. M. (1987). "We'd better watch out", *New York Times*, July 12, Book Review No. 36.

⁸See Triplett, J. (1999) "The Solow Productivity paradox: what do computers do increase productivity. *Canadian Journal of Economics* 32, No. 2, pp. 309-334.



conclude after studying a set of Argentine companies that, in order to maximize the productivity yielded by ICT, businesses need to build innovation incentives, develop the capability of their human resource, and change their organizations. These findings are consistent with the results of research conducted in the industrialized world, where it has been shown that adoption of digital technologies does yield neither a simultaneous nor an automatic productivity improvement. For example, relying on OECD data, Colechia and Schreyer (2002) showed that, in order to yield a positive effect on productivity, ICT adoption needs to be complemented with firm's structural changes. Similarly, based on the analysis of United States data, Gordon (2000) pointed to the need to conduct changes in organization structure and training of human resources in order to achieve the productivity gains promised by ICT. Jorgeson (2008) reached a similar conclusion based on the analysis of United States data.

This evidence has been formalized by introducing the concept of "intangible capital". Cummins (2005) defines it as

the difference between the purchase price of digital technology and the value created once it has been productively assimilated by a firm. He provides an example,

"Suppose a company purchases database software. By itself, database software does not generate any value. At a minimum, the software must be combined with a database and, perhaps, a sales force" (p. 50)

The author goes even further postulating that one should not think about intangible organizational capital as a factor of production that can be acquired in the market. It is rather a distinctive way a company combines its factors of production and has to be developed "in-house".

This short theoretical explanation helps understanding the Latin American challenge. National industrial census data indicates that digital infrastructure adoption is consistently high in most industries and countries. The index measuring adoption of digital technologies across sectors for Argentina, Brazil, Chile, Colombia, and Mexico is, in fact, fairly high across sectors (see table 1).

Table 1. Latin America: Digital Technologies Industrial Adoption Index (Maximum: 100)

	Argentina	Brazil	Chile	Colombia	Mexico	Latin America
Mining	- - -	75.10	72.95	- - -	49.38	65.81
Manufacturing	82.19	80.22	82.32	86.59	70.40	80.34
Health	- - -	81.66	- - -	92.13	67.94	80.58
Retail Trade	- - -	81.78	77.44	83.67	72.09	78.74
Financial Services	- - -	- - -	88.39	- - -	71.54	79.97
Average	82.19	79.69	80.27	87.46	66.27	79.18

Note: The index blends indicators on computer adoption, Internet usage, and LAN deployment (see calculation methodology in appendix B).
Source: Telecom Advisory Services analysis



According to the data in table 1, with the exception of the mining sector in Mexico, no industrial sector of the five analyzed exhibits a digitization index lower than 60 (on a scale of 1 to 100). However, despite this extremely high adoption index across most sectors and countries, the contribution of ICT capital to sector productivity growth remains extremely low (see table 2).

Table 2. Latin America: Contribution of sector ICT capital to economic growth (in percentage points)

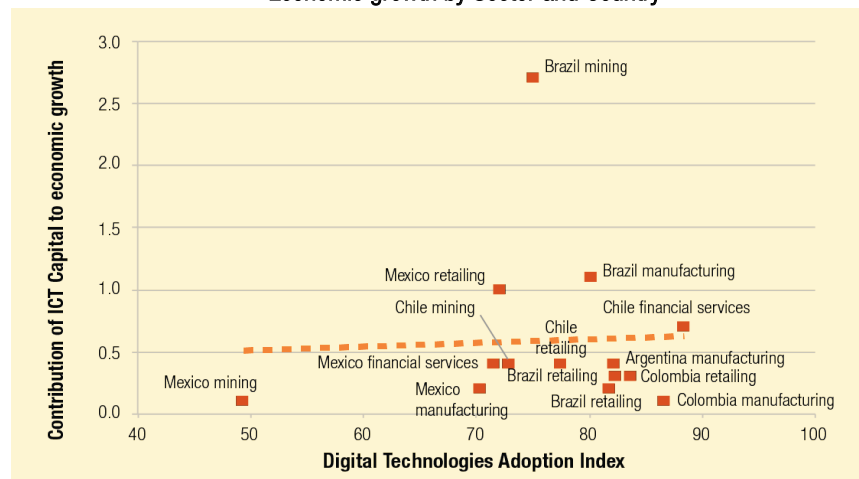
	Argentina	Brazil	Chile	Colombia	Mexico	Latin America (*)
Mining	0.2	2.7	0.4	0.7	0.1	0.8
Manufacturing	0.4	1.1	0.3	0.1	0.2	0.4
Retail Trade	0.6	0.2	0.4	0.3	1.0	0.5
Financial Services	1.6	0.6	0.7	0.3	0.4	0.7
Average ICT capital	0.6	0.8	0.4	0.5	0.4	0.5
Labor productivity	1.1	0.6	2.3	1.6	0.5	1.2

(*) Note: Arithmetic average.

Source: ECLAC based on LA KLMES data, cited in Katz (2015)

Data in table 2 show that, with the exception of Brazil, the contribution of ICT capital to economic growth, while positive, is always lower than that of labor productivity. On a sector basis, ICT capital appears to only have a moderately strong contribution to the economy in Brazilian mining and manufacturing, Argentine financial services, and Mexican retail trade. Furthermore, there is no relation between the digital technology adoption among firms (which is uniformly high as indicated in table 1) and the sector contribution of ICT capital to economic growth (as indicated in table 2) (see figure 3).

Figure 3. Relation between Digital Technology Adoption and Contribution of ICT Capital to Economic growth by Sector and Country



Source: Telecom Advisory Services analysis



The explanation of this discontinuity lies on the limited accumulation of intangible capital. In other words, to yield productivity improvements, the adoption of digital technologies needs to be combined with the hard work of process retooling, organization restructuring, and human resource retraining. This is consistent with our findings from the company interviews.

While most companies told us in the interviews that they had already developed a vision and a digital strategy, the executives also suggested that the level of company readiness to implement a successful digital transformation remains low relative to the challenge. Barriers evoked in the course of the interviews range from limited capacity to retain talent to lack of top management engagement, and low cross-functional coordination. The net result is that, as we will show in chapter 3, while adoption of digital technologies at the company level is high, the assimilation of those platforms at the business process level remains low. That leads to low firm competitiveness and little productivity growth at the national level.

So what needs to be done? We believe the challenge faced by executives of companies in Latin America is how to incorporate digital technologies across production processes⁹. Going digital does not just mean setting up a web-based distribution channel; it requires rethinking the supply chain incorporating technology to dramatically reduce transaction costs,

radically change production processes, generating new business models, value chains, and modes of organization and decision making. These changes should be deployed across value chain functions, including marketing, sales, post-sales services, administration, logistics and transportation.

Where to start? We believe that, to engage in a successful digital transformation, companies need to start by looking at the competitive dynamics in the industries in which they operate, determining how they could rely on digital technologies to increase their value capture by either raising the customer willingness to pay¹⁰ or reducing costs, and examining the company's level of maturity in assimilating digital technologies. On this basis, companies should develop an agenda to transform the company's digital capabilities and define a digital transformation strategy that encompasses all value chain stages going well beyond digital distribution. The remainder of this study will provide the evidence based both on field research and in-depth analysis of national industrial census data that will substantiate the thesis presented above.

For the purpose of this paper, when we say "Production" we refer to the production of goods and services.

A customer willingness to pay captures a quantitative estimation of consumer surplus above the price paid for the good.

⁹ For the purpose of this paper, when we say "Production" we refer to the production of goods and services.

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3. THE DIGITAL TRANSFORMATION IN THE VALUE CHAIN

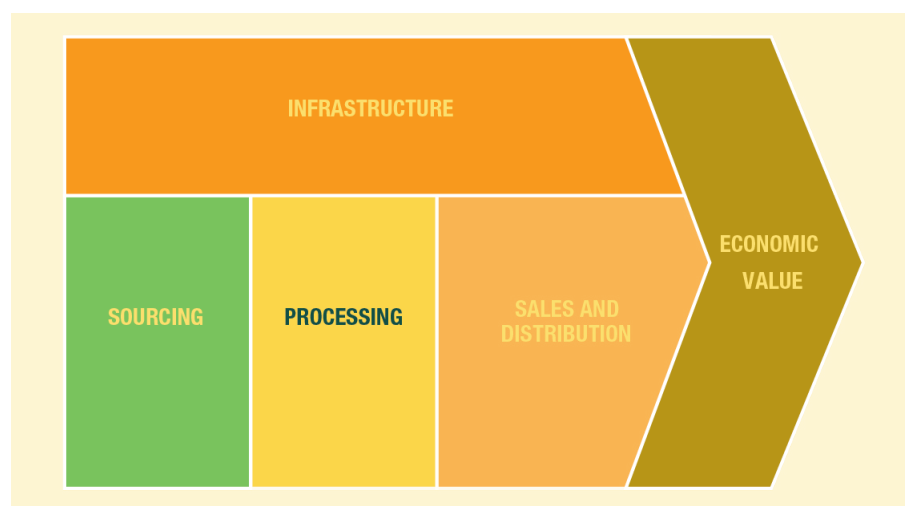
As we mentioned above, the adoption of digital technologies does not indicate their incorporation in the industrial or fulfillment services processes to render them more efficient, flexible and responsive to market changes. The digital technologies industry adoption index presented above (in table 1) is just one indication of the complex process of digitization of the firm. In order to gain a clear view of the stage of digitization of industries across countries we need to rely on the concept of the value chain at the firm level. Porter (1985) defines the value chain as the combination all of the firm's activities undertaken to create value, whereby each of them contributes to raise a customer willingness to pay as well as to reduce

the firm's production costs. Porter conceptualized the value chain in terms of a number of vertical functions (inbound logistics, operations, outbound logistics, marketing and sales, and service) and horizontal ones (firm infrastructure, human resource management, technology development, and procurement).

While we do not have detailed information about the levels of digitization at all of Porter's value chain links, we were able, through the analysis¹¹ of interview data and the national industry census, to measure digitization at four value chain stages: infrastructure, sourcing, processing, and sales & distribution (see figure 4). See methodology of data analysis in appendix B.

Figure 4. Conceptual View to Measure Digitization in the Value Chain

¹¹ See methodology of data analysis in appendix B.





Our analysis of different industries also allowed us to examine in greater detail where companies in particular industries are improving digitization at each stage of the value chain:

Sourcing: The extent of digital processes in the supply chain, including access to information on goods and services and handling of electronic purchase orders on-line, purchase marketplaces, as well as use of electronic banking to conduct financial transactions;

Processing: The degree to which IT is relied upon to automate internal processes through internal systems (e.g. ERP, CRM) or any digital interface with providers of outsourced functions;

Sales and Distribution: The importance of digital processes in the sales function, including the existence of a website, but, more importantly, the transactional capability to receive orders, fulfill and provide customer care on-line; and

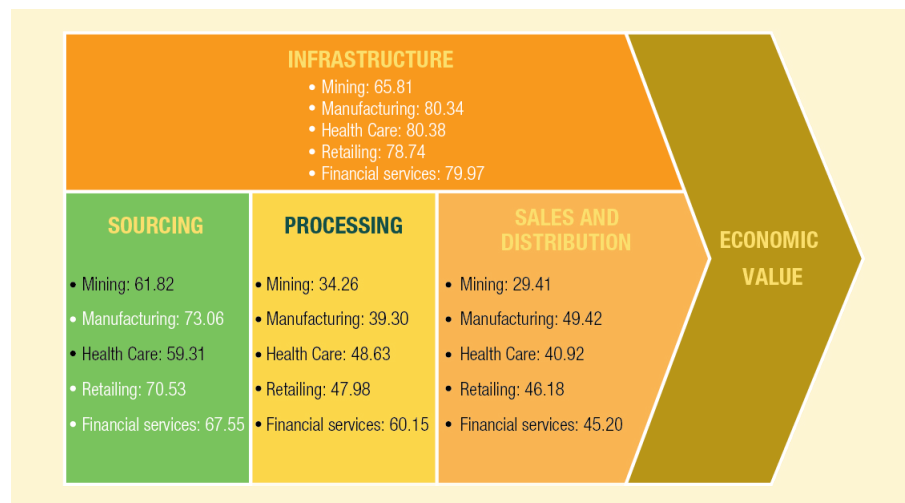
Infrastructure: The sophistication of the underlying IT technology, focusing on the presence and use of computers, operating software and computer networks (wired and wireless) as well as the presence and type of connection to the Internet, including the use of fixed and mobile broadband or other fixed connections, such as cable or leased lines.

The following figure presents the average digitization level, as calculated from National Industrial census, by value chain stage for the five industrial sectors under study (figure 5).

Figure 5. Latin American Industries: Digitization by Stage of the Value Chain
(Calculated from National Industrial Census data)

Note: A digitization level above a 65 index is advanced and highlighted in white

Source: Telecom Advisory Services analysis





As anticipated in chapter 2, the level of infrastructure digitization (that is to say, the adoption of digital technology) is the highest of all four stages of the value chain. The other stage that exhibits advanced digitization is sourcing in three industries: manufacturing, retailing and financial services. Beyond these areas, the other business processes (processing and sales & distribution in all industries, as well as sourcing in mining, and health care) appear to have lower digitization

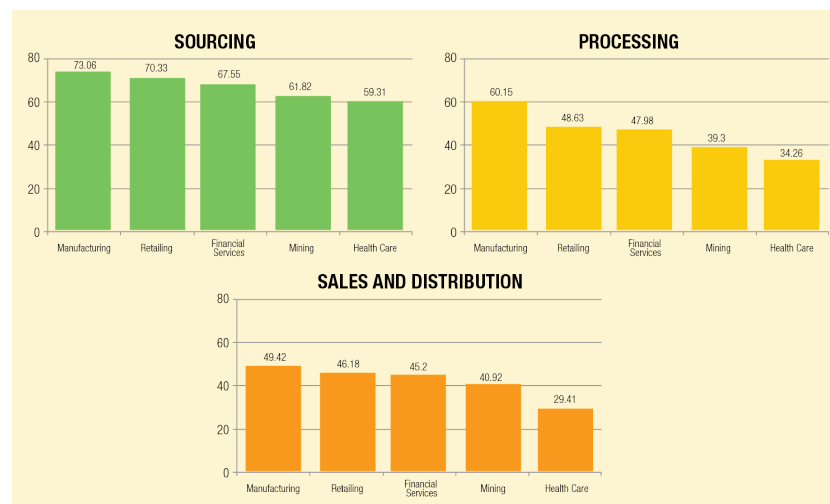
levels.

By ranking the digitization index in the non-infrastructure processes from highest to lowest, the comparative levels of digital technology assimilation can be measured. The “Sales and distribution” process exhibits the lowest digitization level across all stages of the value chain. In addition, mining consistently appears to be the lowest sector of all five industries (see figure 6).

Figure 6. Latin American Industries: Ranking of Digitization by Stage of the Value Chain (Calculated from National Industrial Census data)

Source: Telecom Advisory Services analysis

¹² See detail of samples and methodology in Appendix B.

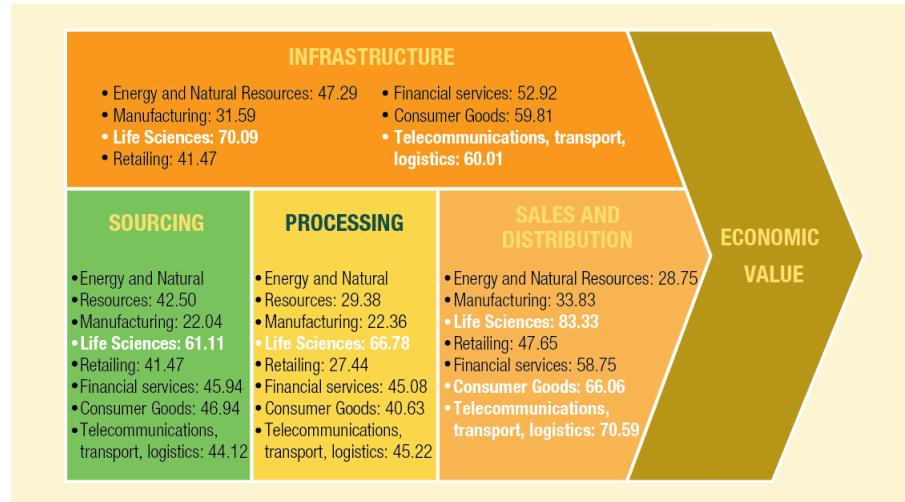


An important element to underline regarding the analysis presented above is that it is based on various census conducted across large samples of industrial establishments with more than 10 employees¹². Our survey, to be presented next, was more limited in scope (177 observations), and covered primarily medium and large enterprises. Along those lines, it is interesting to compare the results to

understand whether there are significant differences between a representative sample of most industrial establishments (except micro enterprises) of a given country, and a sample that is biased toward medium and large companies. Figure 7 presents the average digitization level by value chain stage for the industrial sectors surveyed in our own field research.



Figure 7. Latin American Industries: Digitization by Stage of the Value Chain
(Calculated from our survey data)



¹³ For example, in the National Census data, the technology options to respond on included computer usage, internet/intranet/extranet usage, and LAN deployment while in our survey the choices included Cloud based infrastructure and applications, mobile technologies for customer engagement, customer analytics, digital marketing, social business, internal social networks, Internet of Things, wearable computing, real time monitoring of operations, and crowdsourcing.

The comparison between both samples is enlightening in terms of its differences. The level of infrastructure digitization (that is to say, the adoption of digital technology) is not as pervasive in our survey when compared with national industry surveys. With the exception of Life Sciences (a sample of companies in the pharmaceutical sector) and telecommunications, transport and logistics (a sector that could not be analyzed with the national industrial census data), the other sectors do not appear as advanced in terms of digital technology adoption. One reason explaining the difference is that the questions in our survey were more detailed than those in the national industrial census¹³.

Beyond this, while the national industrial census, presented above, indicates a digital emphasis on the sourcing stage of the value chain (e.g.

the supply chain), medium and large companies in our survey appear to be emphasizing sales and distribution. This could be due to the fact that our research was conducted in 2015 and therefore, answers could depict a rapidly changing environment where consumer adoption of the Internet is driving the interest of companies to deploy digital distribution channels.

Finally, neither data set indicates a digitization emphasis on the processing stage of the value chain. This is a particularly important finding since it highlights one of the major challenges of Latin American economies. As ECLAC's research indicates,

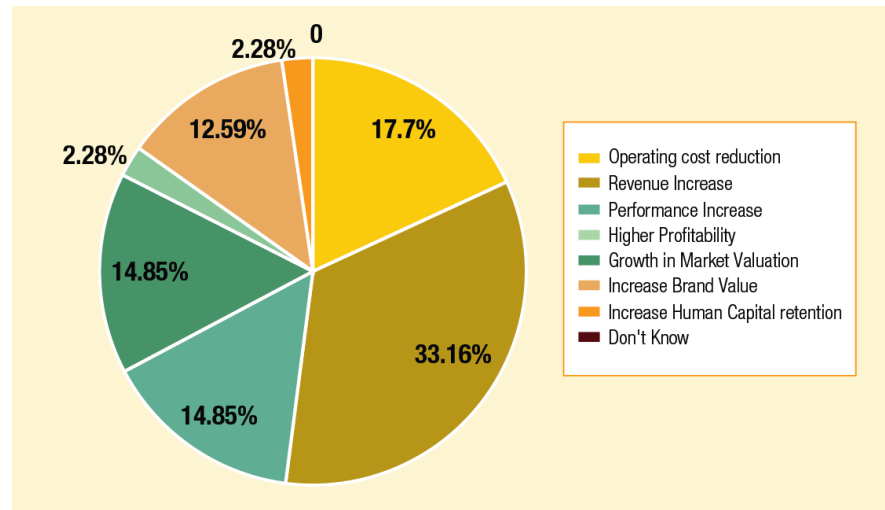
*"The realities of the vast majority of companies in the current production structure of Latin America and the Caribbean" is "a far cry" (from the introduction of) "digital technologies and advanced robotics...to develop cyberphysical production systems"*¹⁴.



This state of affairs is confirmed by the responses in our survey as to where companies expected to gain the highest impact of digitization (see figure 8).

Figure 8. Response to question: “From the following business outcomes, select the one that has higher impact when selecting digital transformation initiatives for your company” (171 answers)

Source: gA; Telecom Advisory Service analysis



See ECLAC (2015). The new digital revolution: from the consumer Internet to the industrial Internet. Santiago, Chile. Prepared for the fifth Ministerial Conference on the Information Society in Latin America and the Caribbean, held in Mexico City from 5 to 7 August 2015. We are cognizant that the subjects that the answer “performance increase” could have referred to either revenue or cost shifts.

Of all answers, 46% perceive the higher impact to be in the areas of revenue increase and enhanced brand equity, a natural reference to distribution and market facing stages of the value chain, and only 18% expect a reduction in operating expenses resulting from streamlining and related efficiencies¹⁵.

To conclude, both the national industrial census data and our research indicate a low level of digitization in the processing stage of the value chain. The only exception is the Life Sciences industry as depicted in our survey data. This could be explained by the fact that companies surveyed were primarily global corporations, where digitization initiatives in Latin America could have been conducted as a result of world-wide efforts led by subsidiaries or corporate headquarters located in the industrialized world.

We are cognizant that the subjects that the answer “performance increase” could have referred to either revenue or cost shifts.

Secondly, while the national census data indicates a consistent advanced level of digitization in infrastructure, the survey data indicates such a developmental state in Life Sciences and Telecommunications, Transport & Logistics. As indicated above, this difference could result from the fact that the survey measures adoption of digital technologies in a more detailed way, covering a more extensive range of platforms.



Thirdly, the national data depicts an embryonic progress of digitization in the sourcing stage of the value chain, while the survey data highlights advancement in sales & distribution. The difference could be explained by the fact that the survey was conducted in 2015 and therefore, answers could be the result of a rapidly changing environment where consumer adoption of the Internet is driving the interest of companies to deploy digital distribution channels. However, both data sets indicate that progress in either stage of the value chain is not consistent across sectors. Manufacturing, Retailing and Financial Services are more advanced in sourcing (according to the national data), while Life Sciences, Consumer Goods, and Telecommunications, Transport & Logistics are more advanced in distribution (according to the survey).

All in all, both analyses indicate a lag in digitization of processing, and an inconsistent assimilation of digital technologies across the other stages of the value chain and industrial sectors. The only glaring exception to this finding is the Life Sciences sector, which would appear to be benefitting from the spill-over influence of digitization initiatives being driven on a global scale.



4. A BUSINESS SECTOR AND COUNTRY PERSPECTIVE: LEADERS AND LAGGARDS

As it is obvious, the Latin American aggregate view by industry sector, such as the one presented above, hides differences across nations. For example, not all manufacturing sectors across the region are equally “under-digitized”. Chapter 3 presented an aggregate view of the level of digitization across value chain stages by industry. However, our research also indicates that some industries in particular countries appear to be at a higher level of progress in adopting digital technologies in specific processes. We consider it useful to identify those in order to understand the factors that have driven those sectors to be at a more advanced level.

The analysis of National Industrial Census data indicates that Chile and Colombia are the most advanced countries in terms of sector digitization (see table 4).

Table 4. Latin America: Average Digitization by Industry and Country
(Calculated from National Industrial Census data)

Source: National Industry Census; Telecom Advisory Services analysis

	Argentina	Brazil	Chile	Colombia	Mexico	Total
Mining	---	52,23	53,71	---	35,81	49,80
Manufacturing	55,83	57,02	53,03	65,09	47,71	57,73
Health Care	---	47,44	---	71,11	45,02	55,93
Retailing	---	58,70	51,76	66,53	44,43	57,85
Financial Services	---	---	58,85	---	51,57	60,21
Total	55,83	53,84	51,84	67,57	45,11	56,30

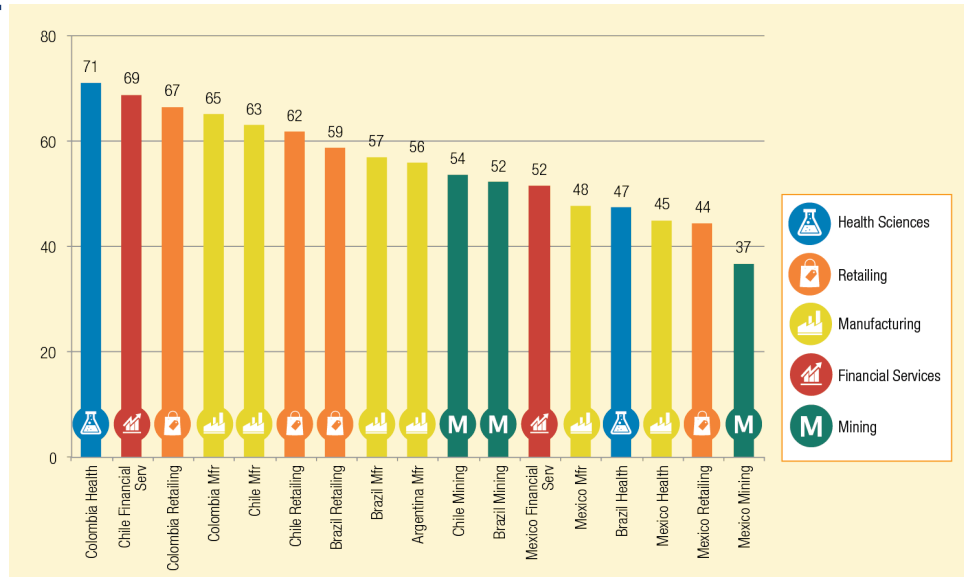
Sectors with a digitization score > 60

Colombia has the highest level of digitization of the five countries under study for Manufacturing, Health Care, and Retailing, while Chile has, in addition to Retailing and Manufacturing, a highly digitized Financial Services sector (despite the lack of comparative data points in other countries). On the other hand, regardless of the country, the mining sector tends to exhibit lower relative levels of digitization, while the other sectors exhibit varying levels of digitization across the region (see figure 9).



Figure 9. Latin America: Average Digitization by Industry and Country
(Calculated from National Industrial Census data)

Source: National Industry Census; Telecom Advisory Services analysis



The evidence gleaned from the National Industry Census in table 4 and figure 9 is somewhat consistent with the results of the analysis of our field research. The following table presents the average sector digitization index by country according to our survey data (see table 5).

Table 5. Latin America: Average Digitization by Industry and Country
(Calculated from our survey data)

Source: gA; Telecom Advisory Services analysis

	Argentina	Brazil	Chile	Colombia	Mexico	Total
Energy & natural resources	28,91	30,17	73,23	38,65	35,47	36,98
Manufacturing	31,99	19,73	33,81	31,16	20,91	27,46
Health Care & Life Sciences	63,11	69,27	74,81	74,81	74,81	70,33
Retailing	6,77 (*)	30,92	42,03	42,03	47,43	39,51
Financial Services	47,37	49,45	52,60	56,04	50,15	50,67
Consumer products	51,92	50,78	59,89	53,51	51,29	53,36
Telecom, transport & Logistics	57,50	78,80	52,37	48,58	50,75	54,98
Other	N/D	N/D	72,66	N/D	42,55	57,60
TOTAL	46,41	44,19	54,40	48,57	46,28	47,99

Sectors with a digitization score > 50



According to this data, the Health Care & Life Sciences, and the Telecommunications, Transport & Logistics sectors are the most advanced as per the sector digitization index, while Manufacturing and Energy & Natural Resources are lagging. On the other hand, Chile is the country with the highest digitization score in Energy & Natural Resources, Manufacturing, Health Care & Life Sciences, and Consumer Products, while Colombia has high digitization in

Health Care & Life sciences, and Financial Services. Finally, Mexico emerges as a high digitization country as well for Health Care & Life Sciences, and retailing, while Brazil exhibits the highest digitization index in Telecommunications, Transport & Logistics.

At this point, it would be interesting to compare the aggregate sector results in our two Latin American data sets to other research conducted in the industrialized world (see table 6).

Table 6. Comparative Ranking of Sector Digitization

Latin America Digitization Index		Europe Digitization Index	United States Qualitative Ranking
National Industry Survey Analysis	gA - TAS Field Research		
Financial Services (60.21)	Health & Life Sciences (70.33)	Financial Services (52.5)	1. Media
Retailing (57.85)	Telecom, transport & Logistics (54.98)	Computers & Electronics (52.4)	2. Retail
Manufacturing (57.73)	Consumer products (53.36)	Media & telecommunications (52.3)	3. Telecom and Financial Services
Health Science (55.93)	Financial Services (50.67)	Automotive (50.0)	4. Consumer Packaged Goods
Mining (49.80)	Retailing (39.51)	Equipment & Machinery (47.5)	5. Automotive
	Energy & natural resources (36.98)	Trade & Retail (46.0)	6. Logistics
	Manufacturing (27.46)	Chemicals (43.5)	7. Health Care
		Basic Manufacturing (43.2)	8. Energy
		Utilities (42.5)	
		Transportation & Logistics (41.0)	
		Consumer Goods (38.0)	
		Construction (36.0)	

Source: gA; Telecom Advisory Services analysis; Booz & Co; Boston Consulting Group

Cognizant of the difficulty of comparing research results based on different methodologies and inconsistent data sets, table 6 yields some interesting highlights:

- The financial services sector appears in two of the four rankings at the top tier of digitization (1st in the Latin America National Industry Surveys, 1st in the European Digital Index), and in the mid tier in the

other two rankings (3rd in the United States; 4th in our field research). As a transaction-intensive sector, the sector has long been the highest spender in digital technologies and has been at the forefront of automation of the front and back office. In our field research, the sector does not appear at the top tier because of a lower digitization of the processing stage of the value chain.

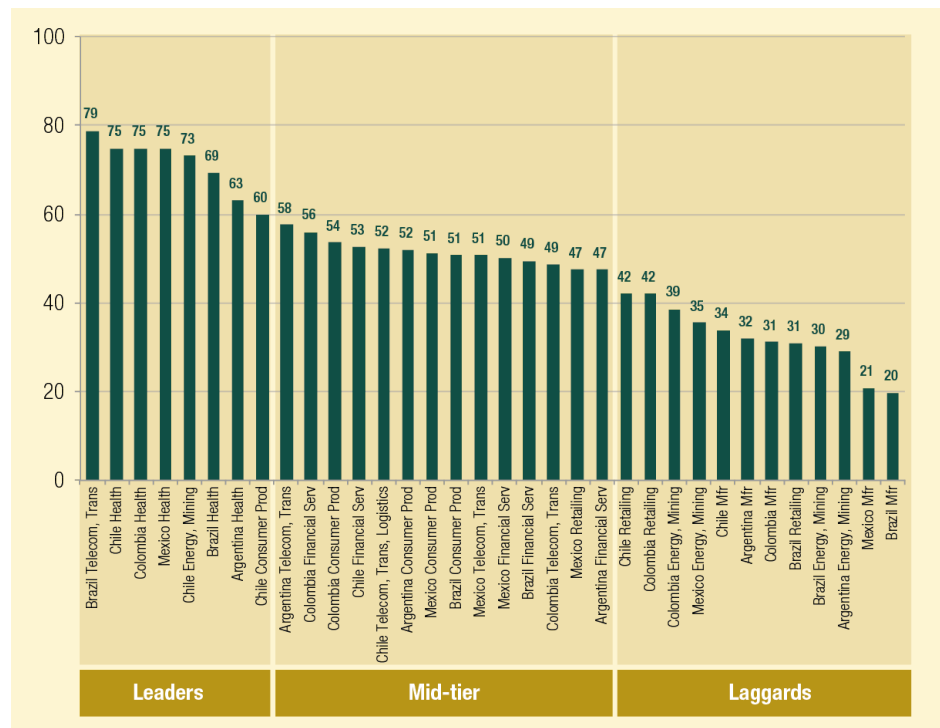


- Retailing is in the top tier in two rankings (2nd in the National Industry Survey, and in the Unites States), 5th in our field research, and 6th according to the European Index.
- The manufacturing sector tends to be ranked at the lower tier (3rd in the Latin America National Industry Surveys, 7th in our field research, and 8th in the European research), reflecting the challenges faced by this sector not only in Latin America, but also around the world in terms of assimilating digital innovation.
- The Energy & Natural resources sector also consistently occupies a position in the lower tier (5th and last in the Latin America National Industry Survey, 6th in our field research, 8th and last in the US research. It would appear that this sector still exhibits significant barriers to assimilate digital innovation, beyond some internal operations.

The ranking of all industries and countries results in the identification of three digitization performance tiers (see figure 10).

Figure 10. Latin America: Average Digitization by Industry and Country
(Calculated from our survey data)

Source: gA; Telecom
Advisory Services analysis

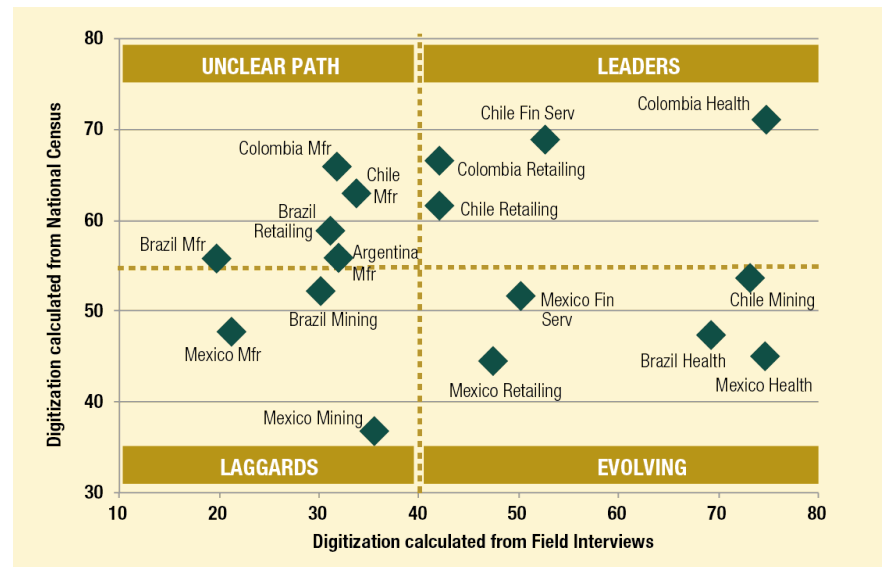




Cross-tabulating both datasets provides some hints as to where specific sectors by country are in terms of their level of digitization (see figure 11).

Figure 11. Latin America: Average Digitization by Industry and Country (according to National Census and our Field Interviews)

Source: gA; Telecom Advisory Services analysis



To reiterate before reviewing our interpretation of this data: the digitization calculated on the basis of the national industrial census (vertical axis) is based on a probabilistic representative sample of all establishments with more than 10 employees in the country, and captures a small number of survey questions; the digitization index based on the field research (horizontal axis) is based on interviews of medium to large companies and captures a much larger number of questions. The national surveys were conducted between 2010 and 2014; the field research was completed in 2Q2015.

The Colombian Health Care & Life Sciences and Retailing, as well as the Chilean Retailing and Financial Services industries consistently score high in both data sets indicating that these four sectors are, without any doubt, the leaders in digitization in the region. The lower left quadrant contains the sectors that could be labeled the laggards: both data sets depict a lower digitization score. It comprises the Brazilian and Mexican mining sectors and Brazilian manufacturing.



In the lower right quadrant, five sectors depict a high level of digitization for large and medium companies and are still in the process of digitization development for the remainder of firms in the industry: the Chilean mining sector, the Brazilian and Mexican Health Care & Life Sciences sectors, the Mexican Retailing and Financial Services sectors.

Finally, the upper left quadrant, containing four of the five manufacturing sectors (Colombia, Argentina, Brazil, and Chile) as well as the Brazilian retailing sector, represents an unclear developmental path. In the aggregate for the large national survey sample, the sectors score relatively high in the digitization scale. However, when researched in more detail based on our survey conducted during this

year, large and medium establishments depict a lower digitization score. This could be the case that manufacturing companies in all of these markets have not yet charted a clear path towards implementing a digital transformation of their production value chain. This interpretation would appear to be consistent with the analysis presented in chapter 3 showing that the digitization of the manufacturing value chain in the region is consistently lagging other sectors.

What are the factors that limit digital transformation of companies the region? What should Latin American companies emphasize in order to deal with these barriers? That will be the subject of our next chapter.



5. THE ENABLERS AND BARRIERS TO INDUSTRIAL DIGITIZATION

What are the factors that facilitate the accumulation of intangible capital necessary to productively assimilate the spending in digital technologies in Latin America? Conversely, what stands in the way of accelerating the rate of digitization of production processes in Latin America? An understanding of these enablers and barriers is needed to identify the initiatives that have to be put into place to develop digitization at a faster pace. We are not focused in this section in the identification of national infrastructure barriers, such as national fiber optic networks. This is not because we deny the importance to the development of the “industrial Internet” of gaining access to high-speed broadband (which in the enterprise side means download speeds higher than 100 Mbps), 4G wireless networks, and server farms oriented to the provision of cloud-based services. On the contrary, we believe these components to be critical for advancing the digitization of industries. However, we think that rendering those available to enterprises of all sizes in all geographies is a matter of public policies, such as government infrastructure spending and a private sector competition model. Our focus in this study is to understand what are the barriers at the firm level that prevent industries from raising their level of digitization. The following analysis is based on the data collected through our survey research.

Senior management involvement in driving the digital strategy

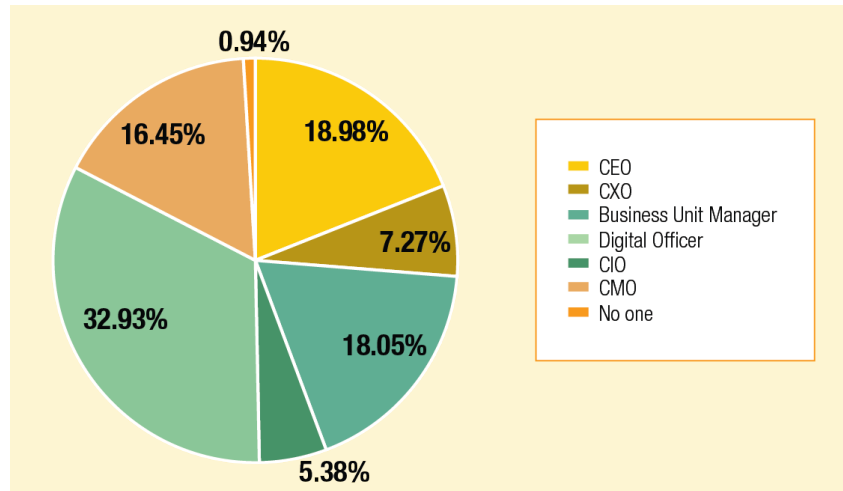
The cross-functional nature of digital transformation would argue for senior management involvement in developing and implementing it. The digitization of an enterprise encompasses not only the development of a digital distribution channel; it entails a restructuring the way day-to-day tasks are being conducted, affecting product development, the supply chain, as well as manufacturing, and, obviously, distribution. Consequently, the scale and scope of restructuring is such that assigning a business unit or functional manager the responsibility of corporate digitization initiatives could seriously weaken the required implementation effort.

Our field research indicates that the member of the management team that is most involved in the development and implementation of digital initiatives is the Chief Information Officer. This could be the result that many companies still consider a digital strategy to be a mere extension of the conventional IT direction (see figure 12).



Figure 12. Response to question: Who drives the digital strategy at your company?
(Chose more than one if apply) (Total answers: 177)

Source: gA; Telecom
Advisory Services analysis



Beyond the Chief Information Officer (104), the Chief Executive Officer (60), Business Unit Leader (57) and Chief Marketing Officer (52) receive approximately equal number of mentions. Interestingly enough, few companies consider it necessary to create a Digital Officer function, preferring to assign the responsibility of managing the development and implementation of a digital strategy to an existing member of the management team. This appears to be a positive approach since management research indicates that the creation of a specialized management function

such as a Digital Officer would result in a position that lacks organizational traction and credibility with a company's core business.

Is the involvement of the Chief Executive Officer in the management of a digital strategy a critical success factor? At face value, relatively few CEOs appear to be involved with digitization (60 mentions out of 177 responses). However, when cross-tabulating CEO involvement with the industrial sectors that score highest in their rate of digitization, a correlation emerges (see table 3).

Table 3. Latin America: CEO involvement in digital strategy vs. sector digitization

Source: gA; Telecom
Advisory Services analysis

		Sector Digitization	
		Lowest (30-50)	Highest (50-70)
Industries where CEO drives digital Strategy	Lowest	<ul style="list-style-type: none"> Manufacturing Energy and natural resources 	<ul style="list-style-type: none"> Health sciences Consumer products
	Highest	<ul style="list-style-type: none"> Retailing 	<ul style="list-style-type: none"> Financial services Telecommunications, transport and logistics



As table 3 indicates, for four out of seven sectors, there is a correlation between CEO involvement and level of digitization: in the Telecommunications, Transport & Logistics, and Financial Services sectors, CEO digital leadership appears to be most pervasive, and therefore correlated with high sector digitization. Conversely, Manufacturing, and Energy & Natural Resources exhibit low CEO involvement across companies, correlated with low digitization level. As for the other sectors, in Health Sciences, the CMO appears to be a key driver, while in the

case of Consumer Products it is the CIO. Conversely, while the Retailing sector exhibits high CEO involvement, its digitization level is low (albeit close to the dividing point of 50 with a score of 47.72). All in all, the survey data indicates that CEO involvement appears to be correlated with digitization performance.

A stronger correlation emerges when executives respond to the question regarding top management involvement in the formulation of overall corporate strategy (see table 4).

Table 4. Latin America: Top management involvement vs. sector digitization

Source: gA; Telecom Advisory Services analysis

		Sector Digitization	
		Lowest (30-50)	Highest (50-70)
Top management involvement	Does not pay attention (>50%)	<ul style="list-style-type: none"> • Manufacturing (57%) • Energy and natural resources (50%) • Retailing (52%) 	
	Part of the overall corporate strategy (<50%)		<ul style="list-style-type: none"> • Financial services (20%) • Telecommunications, transport and logistics (24%) • Consumer products (8%) • Health sciences (0%)

Table 4 shows that whenever top management (including the CEO) does not pay attention to digital initiatives, overall sector digitization index is low. This is the case for Manufacturing, Energy & Natural Resources, and Retailing. Conversely, when respondents indicate that digital initiatives are now part of their firm's overall corporate strategy and have projects in place (implicitly with support of senior management), sector digitization is high. In sum, top

management involvement in development and implementation of digital initiatives matters and is directly linked to superior digitization levels.

Digital Strategy development versus implementation

As explained in chapter 2, our thesis has been that the main barrier standing in the way of digital transformation was the accumulation of intangible capital (that is to say the retooling of business processes, organization restructuring,

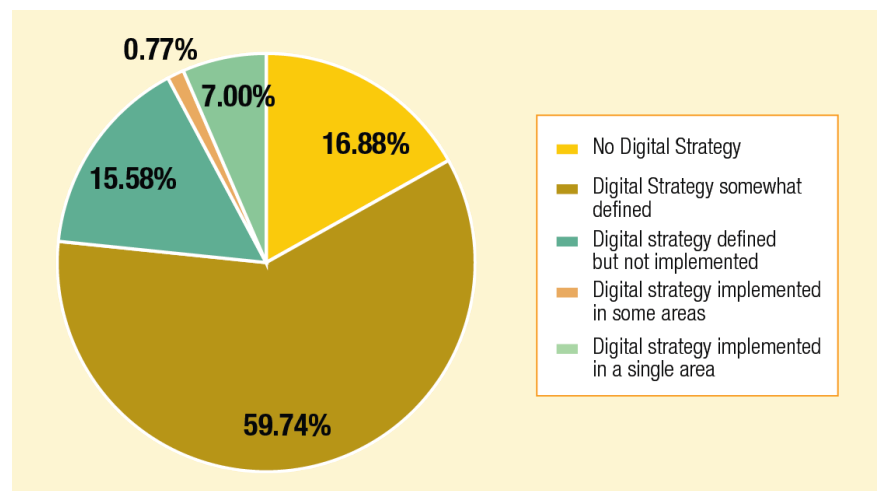


and training of human resources, among other initiatives). This was partially confirmed by the finding that, according to national industrial census, most companies in Latin America were at an advanced stage of adoption of digital technologies (the infrastructure stage of the value chain), while the impact on productivity of this level of ICT adoption was low. and training of human resources, among other initiatives). This was partially confirmed by the finding that, according to national industrial census, most companies in Latin America were at an advanced stage of adoption of digital technologies (the infrastructure stage of the value chain), while the impact on

productivity of this level of ICT adoption was low. Another way of assessing how serious the lack of intangible capital is in Latin American firms could be to ask the companies themselves about their readiness to conduct a company-wide digital transformation. Along these lines, we first asked companies to report what stage they saw themselves to be at in terms of development and implementation of a digital transformation effort. Most companies interviewed (164 answers) indicated that they either had a digital strategy defined but not implemented or already had put one in place (see figure 13).

Figure 13. Response to question: Which state best describes the current stage in which your company is in terms of digital strategy (total answers: 177)

Source: gA; Telecom Advisory Services analysis



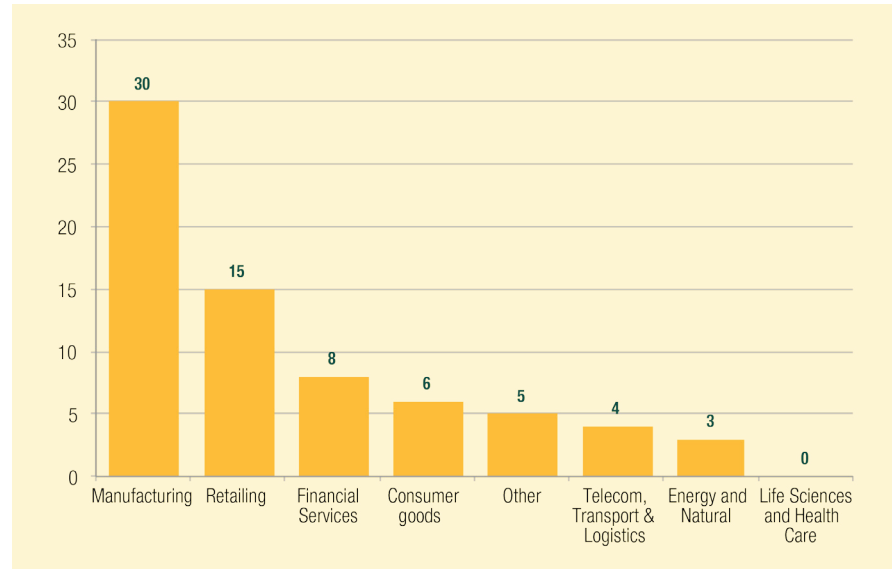
On the other hand, only in 13 out of 177 answers, the company reported not having a digital strategy at all. In an additional interesting finding, 58 answers reported having a digital strategy somewhat or fully defined but

not having yet implemented it. In fact, the bulk of companies that do not have a strategy or have one but have not implemented it yet concentrate primarily in the manufacturing and retailing sectors (see figure 14).



Figure 14. Companies that either do not have a strategy or have one but have not implemented it

Source: gA; Telecom Advisory Services analysis



As shown above, Manufacturing and Retailing, the two sectors with the highest number of answers of no digital strategy or having a non-implemented digital strategy, are the ones with lowest digitization level. This would imply that digital transformation is contingent upon a carefully crafted digital strategy. As expected, no digital strategy or even a partially defined one is situations that are not conducive to a digital transformation.

Company culture appears to be critical for implementing a digital transformation

What other factors beyond top management involvement and the formulation of a strategy are critical to implement a digital transformation? Management research has indicated that a firm's culture could act as either an enabler or a barrier to digital transformation. Two factors have been pointed out as metrics of cultural proclivity to change: the internal availability of specialists in digital transformation (which include not only IT staff but also digital strategists, process reengineers, and change managers), and the capability of implementing corporate initiatives on a cross-functional basis. As mentioned in chapter 2, intangible organizational capital cannot be bought; it has to be generated within the firm, which means that the company needs to attract the right talent with multidisciplinary background not only in IT, but also strategy and change management. Furthermore, if digital specialists are not part of the corporate staff or are somewhat isolated from the organization's center of gravity, a company will have considerable difficulty to implement a digital transformation.

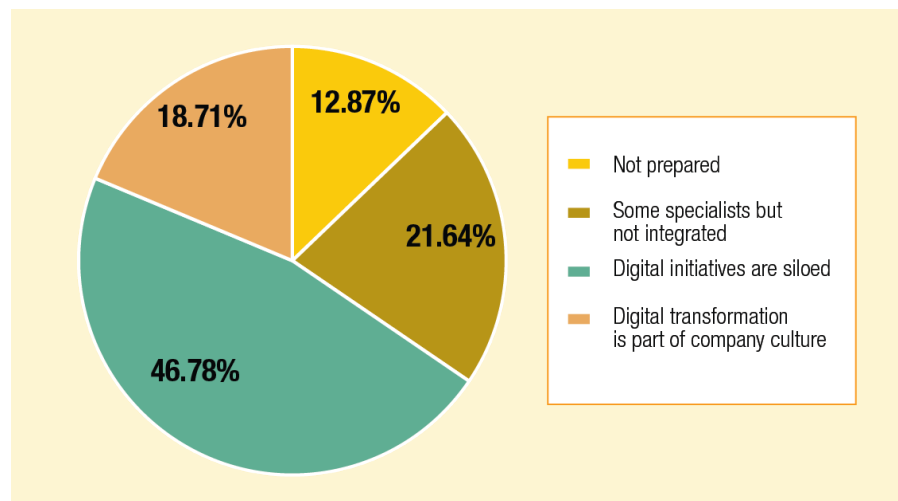


The second condition related to a company's "cultural DNA" which influences its proclivity to transformational change has to do with the ability to build cross-functional bridges that overcome conventional organizational silos. While it is true that digitization has an impact at the functional level for each stage of the value chain, the systemic nature of organizational linkages (such as product development, engineering and manufacturing) requires that an organization-wide digital transformation be conducted through cross-functional teams that are capable of working together.

In fact, our interview data indicates that most of the companies interviewed face either the lack of internal specialists or the inability to work cross-functionally (see figure 15).

Figure 15. Response to question: From the following statements, select the one that best describes your company's culture and employee readiness for digital transformation (total answers: 171)

Source: gA; Telecom Advisory Services analysis



According to the interview data in figure 15, 22 respondents indicate that their company is not ready to conduct a digital transformation and that they need to hire specialists and train an internal team that can lead the effort. On the other hand, 37 responses indicate that, while some specialists exist within the ranks of corporate staff, they operate in isolation and are not integrated with the company's core culture. Finally, 80 interviews report that, if while digital transformation initiatives have already been launched, they are not part of a corporate-wide effort. These metrics are significant and confirm one of the main theses of this study: even if Latin American corporations have defined a digital strategy, significant cultural barriers remain that restrict any implementation effort to a few areas, preventing the implementation of an over-arching transformation.

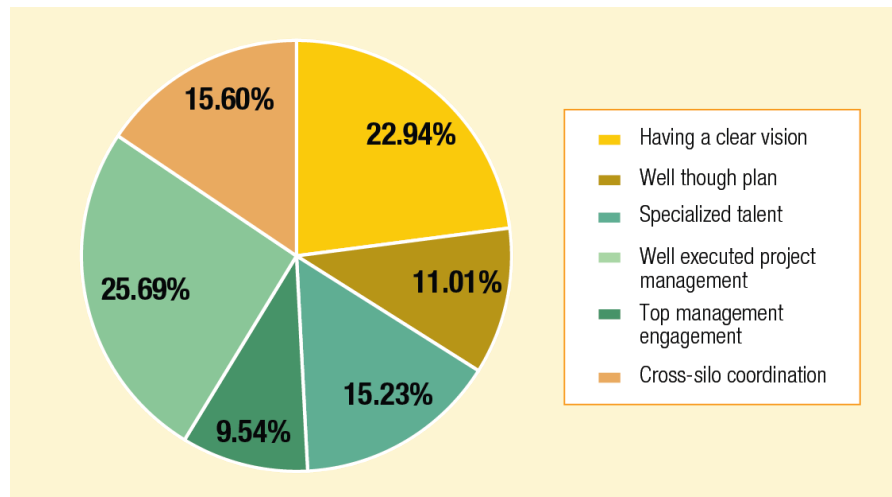


Critical enablers of a digital transformation

So far, we have identified lack of senior management involvement, absence of a strategy, lack of internal digital specialists, and difficulty in working cross-functionally as critical impediments to digital transformation. At this point, we were interested in validating this conclusion by asking Latin American executives what, in their perspective, were the most critical enablers of a digital transformation project (see figure 16).

Figure 16. Response to question: What are the most important enablers when implementing a digital transformation project (total answers: 171)

Source: gA; Telecom Advisory Services analysis



Interestingly enough, the most important enabler with the highest number of responses is “top Management engagement” (140 responses), followed by “Having a clear vision” of how technology can help achieving a competitive advantage (125 responses). These answers are consistent with the analyses presented above. Again, senior management support and strategic direction are the top concerns that will make a digital transformation successful.

This does not mean that other enablers are not important. In particular, availability of specialized talent (83 responses), and cross-silo coordination (85 responses) are also critical. These two priorities amply confirm the impediments highlighted above.

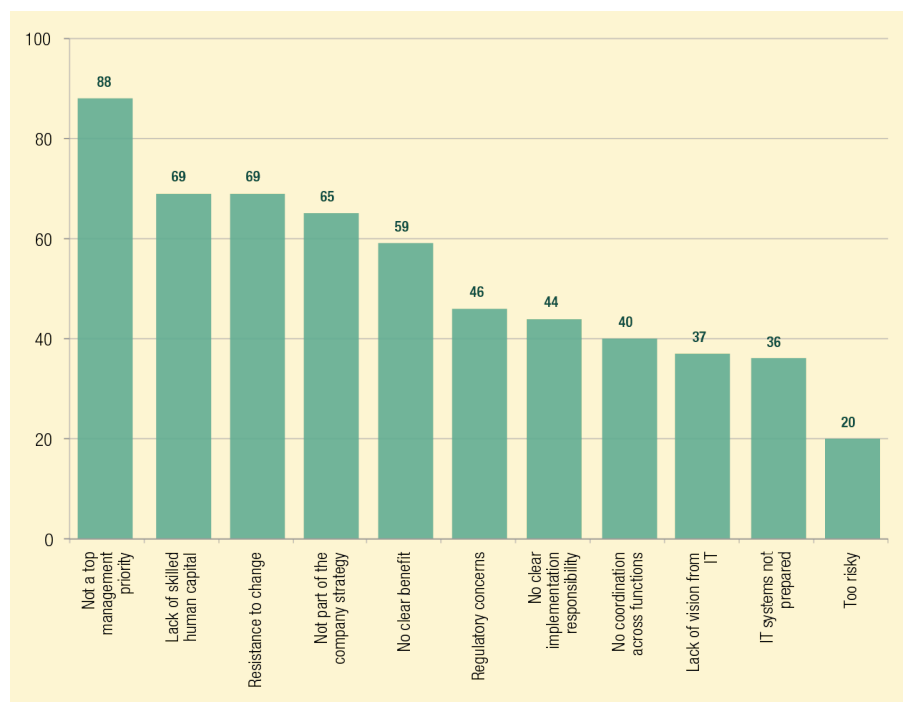


Most important barriers to digital transformation

The identification of enablers done above is complemented with an assessment of the most important barriers to achieving a digital transformation. Respondents to our survey were requested to identify the most important obstacles (see figure 17).

Figure 17. Response to question: What are the most important barriers when implementing a digital transformation project (total answers: 171)

Source: gA; Telecom Advisory Services analysis



While “no top management priority” is identified again as the top barrier, the lack of readiness takes the form of several key additional barriers:

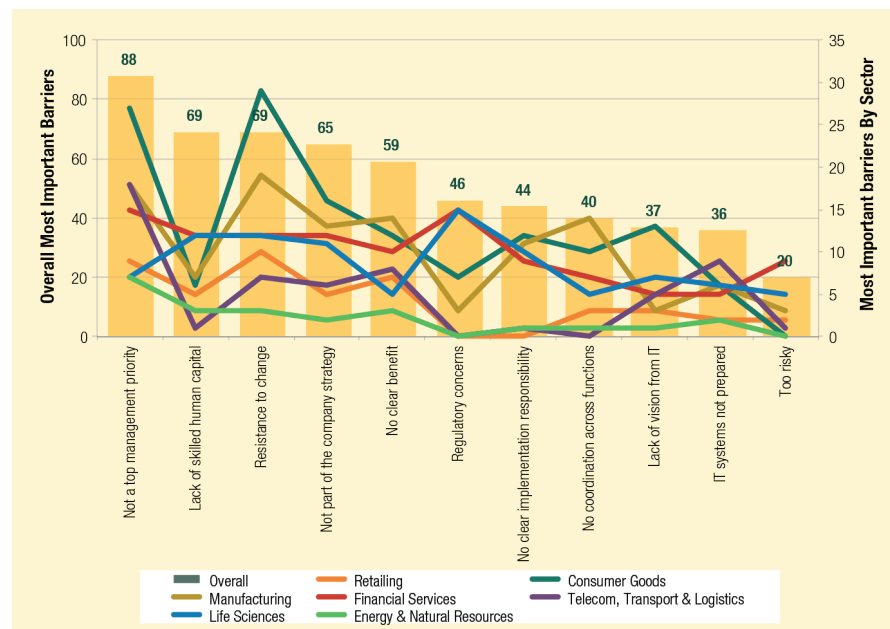
- Lack of skilled human capital to implement a digital transformation
- Organizational resistance to change
- Digital transformation is not part of the company’s overall strategy
- Difficulty to establish a positive risk/benefit equation to implement a digital transformation



It is important to note that disaggregated view of barriers by industry sector highlights differences across industry sectors (see figure 18).

Figure 18. Response to question: What are the most important barriers when implementing a digital transformation project – Overall and sector results (Total answers: 171)

Source: gA; Telecom Advisory Services analysis



For the Consumer Goods and the Manufacturing industries, the most important barrier is organizational resistance to change. For Financial Services and Life Sciences, as expected, the most important barrier to digital transformation is regulation. In Telecommunications, Transport & Logistics, limited top management prioritization is prominent. Finally, in the case of Retailing several barriers are equally relevant, ranging from limited top management endorsement, to lack of human capital, resistance to change, and no integration with corporate strategy.

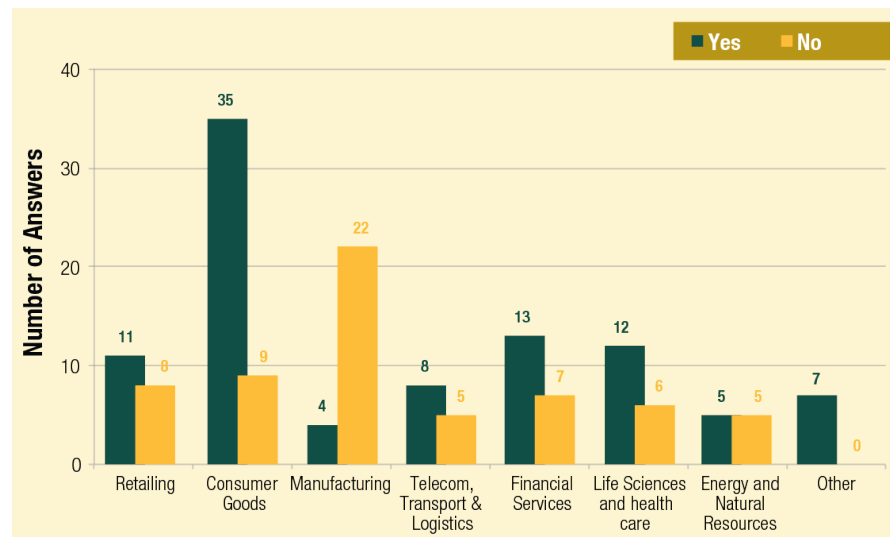


Governance is a critical requirement for implementing digital initiatives

Another enabler of digitization of production is the establishment of a governance process overseeing the implementation of digital initiatives. Our survey of Latin American companies indicates that in over a third of cases, executives acknowledge the lack of a governance framework for implementing the digital transformation effort (see figure 19).

Figure 19. Response to question: Has your company defined a governance process for implementing digital initiatives? (Total answers: 157)

Source: gA; Telecom Advisory Services analysis



As the data in figure 19 indicates, two industries exhibit starkly different situations when it comes to the existence of digital governance processes. Consumer goods firms appear to have a strong prevalence of a governance framework, while this feature is missing within manufacturing companies.



Difficulty in outlining incentives tied to digital transformation

Defining incentives for conducting a digital transformation is a difficult endeavor. In essence, in order to achieve a corporate-wide transformation leading to a highly digitized enterprise requires aligning the objectives of managers and employees to conduct a fundamental restructuring of the organization. Setting up a digital subsidiary disconnected from the core business is relatively easy compared to the kind of change discussed in this study. In particular, some of the difficulties have to do with the fact that the nature of work of firm's employees and responsibilities of functions might change. In this context, we attempted to identify in our survey to what extent Latin American companies were relying on either material or non-material incentives to stimulate implementation of digital initiatives (see table 5).

Table 5. Response to question: From the following statements, select the one that best describes the link between digital transformation outcomes and incentives in your company (choose more than one if apply) (responses: 171)

Source: gA; Telecom Advisory Services analysis

	There are no incentives of any kind tied to digital business transformation outcomes	There are awards but no-monetary incentives for business transformation outcomes	There are monetary incentives for digital business transformation outcomes	Total
Retailing	8	2	10	20
Consumer Goods	31	13	5	49
Manufacturing	21	1	8	30
Telecom, Transport & Logistics	7	0	10	17
Financial Services	6	7	7	20
Life Sciences and health care	6	11	1	18
Energy and Natural Resources	9	1	0	10
Other	6	1	0	7
Total	94	36	41	171

As table 5 indicates, in 41 out 171 responses a bonus is set up and linked to the fulfillment of digital transformation goals. On the other hand, 36 responses indicate the use of non-monetary awards, while 94 companies do not award any type of incentives. Considering how fundamental the changes embodied in digital transformation are, it might be useful to consider a wider use of both

monetary and monetary incentives.

As expected, the award of incentives has to be linked to the ability of meeting key performance indicators that measure the outcome of digital transformation initiatives. Only 44% of companies surveyed have defined and established key performance indicators, which would allow them to assign incentives for their fulfillment.



To sum up, the analysis of enablers and barriers as reported in responses to our survey research allows codifying a number of factors that can facilitate the implementation of digital transformation initiatives:

- **Senior management involvement and endorsement of a digital transformation process remains a factor critical to the success of the initiative:** involvement should be conducted by assigning responsibility of strategy implementation to a C-level executive. Additionally, the direct endorsement and involvement of the CEO has to be ensured. The latter should not just assume that by delegating responsibility to a direct report, this critical success factor is going to be fulfilled.
- **The success of digital transformation is contingent upon a carefully crafted strategy.** A digital strategy focused on a single function (i.e. distribution) is not enough. A digital strategy needs to be overarching and underpinned by a corporate-wide vision of the target and resulting competitive advantage position to be achieved from digitization. In addition, the strategy needs to be supported by an assessment of benefits that would outweigh the transformation risk.
- **Certain features of a company's culture are critical to succeeding in a digital transformation.** Even if a company has defined a digital strategy, significant cultural barriers remain that restrict any implementation effort to a few areas, preventing the implementation of an over-arching transformation. Among those barriers to be tackled, two are critical: 1) ensure internal availability of specialists in digital transformation (which include not only IT staff but also digital strategists, and change managers), and 2) break down business unit silos in order to build the capability of implementing corporate-wide initiatives on a cross-functional basis. These two approaches will be instrumental to breaking the internal resistance to change.
- **Beyond the changes in corporate culture, it is necessary to define a governance process to oversee the implementation of digital initiatives.** The governance process provides the necessary framework for engagement of senior management and oversight of the transformation effort.
- **Governance of digital initiatives needs to be complemented by monetary and non-material incentives.** In order to achieve a transformation entailed in a transition to a highly digitized enterprise requires aligning the objectives of managers and employees to conduct a fundamental restructuring of the organization, and this can only succeed if the proper set of incentives are defined so all internal resistance and behavioral barriers are overcome. Furthermore, the incentives can only be implemented if a set of company defined and established KPIs exist to measure outcomes of digital transformation initiatives.



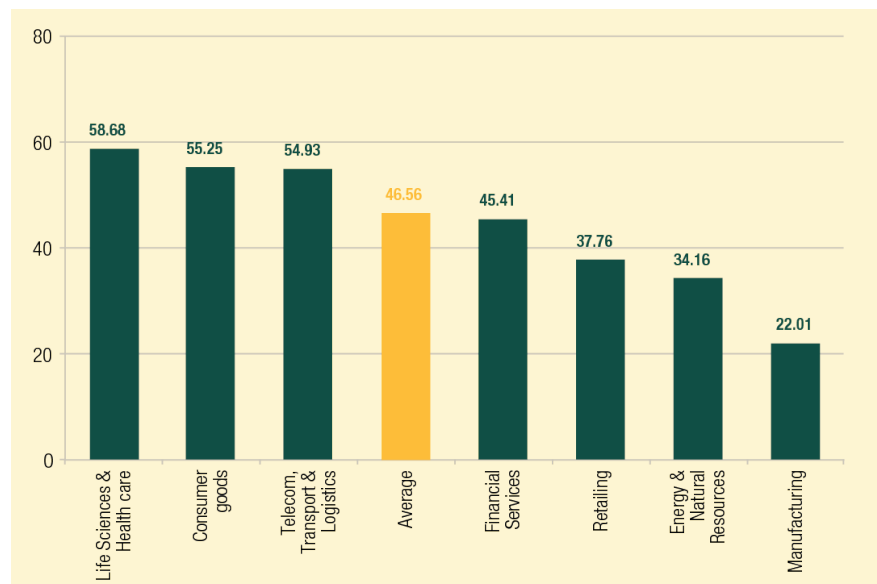
6. ARE LATIN AMERICAN COMPANIES READY TO CONDUCT THEIR DIGITAL TRANSFORMATION?

In light of the checklist of capabilities a firm needs to develop to achieve a digital transformation (presented in Chapter 5), it is necessary to evaluate to what extent Latin American companies are ready to conduct such a process. For this purpose, we have developed a digital transformation readiness index that is calculated on the basis of four questions that were part of the research we conducted in the field¹⁶:

- From the following statements, select the one that best describes your company's culture and employee readiness for digital transformation
- In your opinion, evaluate the level of importance that the following barriers have to digital transformation adoption in your organization
- Has your company defined a governance process for implementing digital initiatives?
- Has your company defined and established key performance indicators to measure outcomes of digital business transformation initiatives?

The reality, as depicted by the digitization readiness index, is sobering. Only three of the seven industrial sectors that have been analyzed, exhibit an index higher than 50 (on a 1-100 scale) (see figure 20). Coding of answers and index calculation are reviewed in appendix C.

Figure 20. Latin America: Digital Readiness Index by Sector (scale 1-100)



Source: gA; Telecom Advisory Services analysis

¹⁶ Coding of answers and index calculation are reviewed in appendix C.

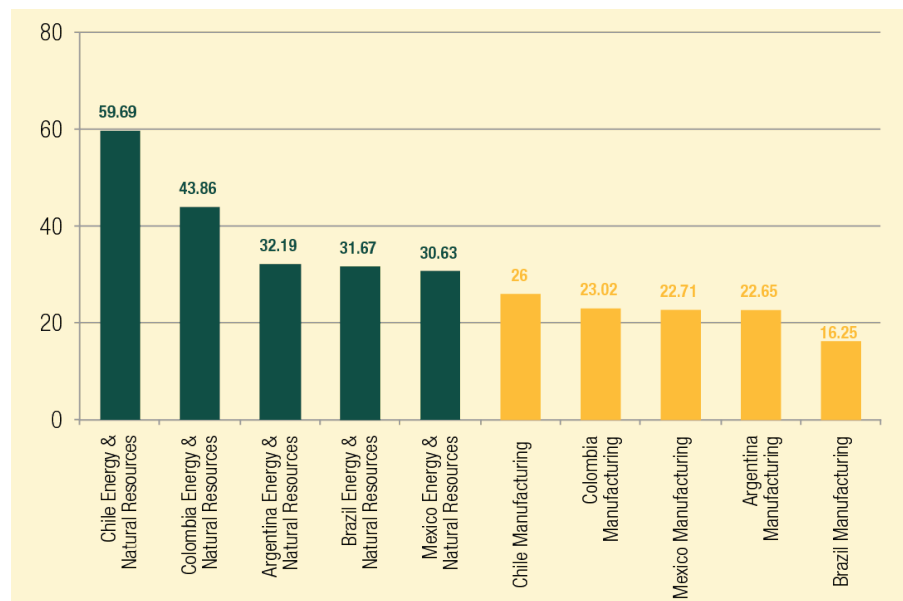


With average digital readiness index of 46.56, Latin American companies exhibit a significant gap in capabilities to tackle their digital transformation. Obviously, this picture is not homogeneous. The Life Sciences & Health Care, Consumer Goods, and Telecommunications, Transport & Logistics sectors appear to be better equipped to tackle the challenge.

However, the most worrisome piece of evidence resulting from this analysis is the situation of the manufacturing sector. Not only does the manufacturing sector exhibit a low level of digitization (one of the lowest sectors according to both the National Industrial Survey, and according to our own field research questionnaire) (presented in chapter 4), and the lowest contribution of ICT to productivity growth (presented in chapter 2), but it now appears that it is not ready to tackle the digitization challenge. The situation is equally worrisome in the case of the Energy & Natural Resources sector. An analysis of these two sectors by country would indicate that the readiness challenge is consistently acute in manufacturing across countries, and the Energy & Natural Resources sectors in Argentina, Brazil, and Mexico (see figure 21).

Figure 21. Latin America: Digital Readiness for Manufacturing and Energy & Natural Resources (scale: 1-100)

Source: gA; Telecom Advisory Services analysis



In sum, while Latin American firms still exhibit a significant lag in terms of their readiness to tackle the digital challenge, the situation is particularly serious in manufacturing and Energy & Natural Resources. Limited readiness stands in the way to accumulate intangible organizational capital needed to face this challenge. This provides the context to specify a set of recommendations to address this challenge.



7. THE ACCUMULATION OF INTANGIBLE CAPITAL: A CAPABILITIES PERSPECTIVE

In Chapter 2 we introduced the concept of “Intangible Capital”, defined in the economics literature as the difference between the purchase price of digital technology and the value created once it has been productively assimilated by a firm. At a more specific level, intangible capital is conceptualized as the restructuring of a business organization, retooling of its business processes, and the training of its human resources to achieve a full productive impact of digital technologies. Our research clearly indicates that, while Latin American businesses have spent considerable capital in the deployment of new technologies, the expected gains in productivity have not yet been achieved. This confirms our view that one of the main challenges our economies face is how to accumulate intangible capital. Our assessment of the readiness of Latin American businesses to achieve their digital transformation concluded that a holistic vision and approach to capabilities development is required. This chapter focuses on our perspectives of how to successfully tackle the upcoming challenges.

A Vision: What are we trying to achieve through Digitization?

The companies that are successfully competing in the digital economy have in common the fact that they have

developed a clear vision on how to create a sustainable competitive advantage through digital transformation, and have found the leadership and the execution capabilities to do so. Marcos Galperín, founder and CEO of *Mercado Libre*, the leading digital electronic commerce platform in Latin America, had the vision since his time at Stanford Business School, that anyone could buy anything at the right price, as long as one could build a transparent transactional environment, designed to qualify buyers and sellers and ensure timely and inexpensive delivery. Today *Mercado Libre* is the absolute leader in the e-Commerce space in Latin America with \$7.3 billion in transactional flows in 2013, growing at almost 30% annually.

Digitization has been critical to achieve this position. *Mercado Libre* has completely digitized its value chain by creating an open API architecture environment, developing an ecosystem of hundreds of external developers, which allows vendors to automatically integrate into the marketplace. Furthermore, *Mercado Libre* has achieved a superior customer experience in mobile-driven transactions, which have become the biggest contributor to sales expansion in the last 2 years.



On the other hand, other industries in Latin America are experiencing more difficulty in creating or building a shared vision for digitization. For example, some of the largest integrated oil and gas companies in the region do not have a comprehensive vision, and are still struggling with the current oil prices environment, foregoing or delaying attractive digital transformation opportunities in the downstream and retail businesses. Obviously, it is easier to define a vision for a company that is born digital, such as *Mercado Libre*, than for one that has to transform itself from a pre-digital operating model, permeated by legacy technologies and business processes.

The development of a digital vision therefore requires integrating an overarching strategic perspective of a company's competitive position and capabilities with a statement comprising its value proposition to the customers served, its economic objectives, the position in the industry value chain, and the capabilities required. The vision needs to contain a compelling long-term, enterprise-wide statement of strategic intent. Its objective is not only to motivate and inspire employees but also to signal customers the medium to long-term direction of the company. The vision needs to be constructed based on limited consensus building effort, through a process driven by top management.

Willingness to transform

Our research indicated that one of the most important barriers to achieve a digital transformation of Latin American businesses is organizational resistance to change. In this context, the challenge remains building a willingness to transform. To achieve this, it is necessary to clearly articulate the organizational goals for digital transformation, and, more importantly, to lead the organization to achieve it. The journey towards becoming a digital enterprise requires an organization-wide transformation, and this kind of fundamental change needs leadership. A major transformation process will have far reaching impact across the whole of the enterprise: its people and organizational structure, its business processes, its core systems and its ability to orchestrate all the new digital technologies, risk and return considerations. Ultimately, the overall transformation effort will have to create measurable shareholder value.

El Palacio de Hierro (EPH), the Mexican iconic high-end department store chain, takes digital business transformation very seriously. Its major digitization program was launched in 2012. The initiative was initially sponsored by its CFO Daniel Elguea, who in turn included the CIO, Agustín Arredondo, and the Project Director, Israel Enriquez Reynoso in the leadership team.



The goals of the program were to increase productivity in the entire value chain, consolidate analytical reporting reducing reporting lead times, and aligning the 13,000 staff with the new strategy.

Major areas of focus included business process transformation, a sweeping change management to align the staff and the leadership teams, and a complete overhaul of their core technologies, preparing *EPH* to be ready for subsequent phases of the program.

A comprehensive Digital Transformation program comprises the following building blocks:

- Empowerment from senior management and buy-in from the operating executives;
- Clear financial goals, such as required capital expenditures, savings to be generated from higher operational efficiencies, and incremental revenues to be achieved through productivity enhancement;
- A Business Process transformation framework that maps how to incorporate digital technology in all aspects of the operating model;
- Alignment of the people in the organization with the transformation goals, using communication workshops, training and change management programs, creating the incentives to ensure they become a part of the process;
- An IT function capable of orchestrating the new technologies with the existing landscape of core applications, data and infrastructure; and
- A roadmap that includes an agenda for all the potential digital transformation initiatives that will be needed over the next several years, planning for shorter, high-impact project cycles, over a 3-5 year horizon.

The development of such a program comprises six phases (see figure 22).

Figure 22. Digital Transformation Program

Source: gA;





The process begins by identifying the areas of opportunity for introducing digital technology in the enterprise. While deceptively simple, this step requires an in-depth understanding of disaggregated economics by function, the flow of vertical (supply chain, processing, distribution) and horizontal (human resources, accounting and finance, legal, etc.) business processes. Simultaneously, the digital discovery process needs to be framed within strategic considerations, such as competitive intensity, and the desired level of disruption to be achieved through the digital repositioning. Once the opportunities have been identified, program management should determine all payback dimensions, ranging from economic and financial to more qualitative metric such as the capability to retain talent.

The output of the discovery step sets the stage either for the development of prototypes of each of the new identified initiatives, or moving into the road-mapping phase, depending on the maturity level of each of the initiatives. By selecting a prototyping approach to the development of digital solutions, the organization signals that the philosophy underpinning technology acquisition and deployment will be guided by “launch and learn” approaches that characterize business development at start-ups. This approach also signals a cultural change, indicating that the business is migrating away from conventional stage-gated systems development approaches with lengthier “time to market”.

In the next phase the effort moves to

elaborating a more conventional roadmap effort to understand sequence and interdependencies. During this phase, the leadership team will use different portfolio management techniques to assess the economic and business impact of each initiative: Cost/Benefit Analysis, Product/Market assessment, Growth Horizons analysis and Business Case development, leading to a 3-5 year tactical and strategic agenda. We cannot overemphasize the importance of this step in making sure that transformation proceeds across an orderly path with limited disruption. It is only after the roadmap is formalized that the actual organizational transformation begins. Conventional program management techniques, such program management office, steering committee oversight, and an incentive framework could be relied upon at this stage.

The sustainability step, which starts after the program has been completed, is particularly important. It is predicated upon building a continuous learning and adapting capability throughout the business. Sustaining a digital transformation requires that the whole organization (from the top-down) is porous enough to detect changes in market dynamics (such as competitive moves, and shifts in customer needs) and be capable to introduce modifications to the original digitization plan that can respond to these changes. In that sense, even if the digital transformation program could be a one-time event, if successful, it should trigger a “learning culture” of continuous transformation.



Value Management

One of the biggest challenges faced by Latin American businesses has been to adequately measure the incremental economic value of digital transformation. Throughout our survey, we found that companies had difficulty in measuring value creation through digital transformation¹⁷. However, at the same time, only half of the participating companies had actually defined and established key performance indicators to measure the outcome of digital transformation initiatives.

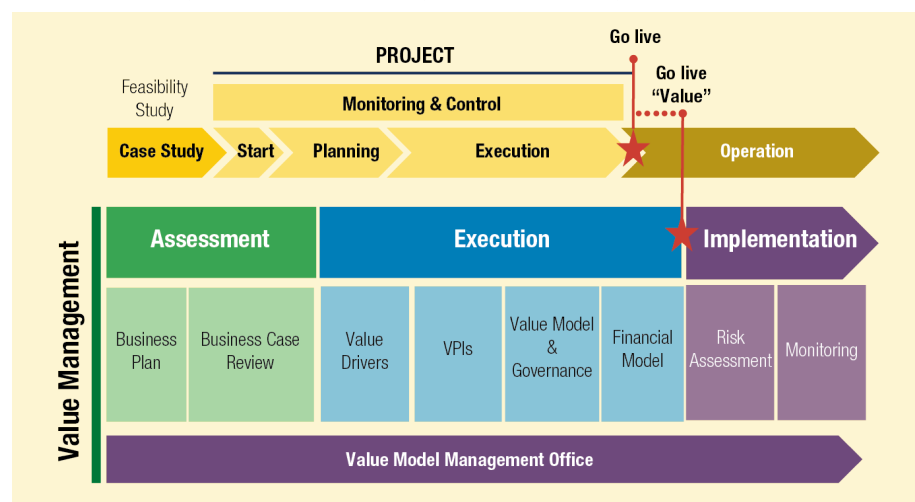
¹⁷ To the question: “In what percentage could your company’s sales increase with the adoption of digital technology?”, 30% of the companies said either no changes or simply that it could not be measured; 50% declared it contributed to 10% to Sales Growth, but only 20% declared it contributed to substantial incremental growth.

How do we measure the impact digital technologies can have on productivity? Value Management has to be the starting point in a major transformation project: Once the vision has been established, companies need to define a quantitative understanding of the potential impact of Digital Transformation. The starting point is a business case that defines the goals of the transformation project, the required investment, and which are the sources, or “value drivers” that will unlock value and productivity through digital transformation. While this practice has been utilized frequently, we have observed that common mistakes in its implementation include optimistic assumptions regarding impact, superficial implementation risk and opportunity cost analysis, and limited willingness to stress test the case. In our experience, the key factor has been the ability of the transformation leadership team to “close the loop”, in terms of successfully establishing the tools, methodologies and processes that will monitor and measure incremental value, and the validity of the business assumptions over time.

Using the development of a business case as a starting point, a Value Management framework that can help align strategy and successful execution (see figure 23).

Figure 23. Value Management in the Project Life Cycle

Source: gA





At the executional and implementation levels, the key components of a Value Management model are:

- Value Performance Indicators, or VPIs, to be achieved on a quarterly or annual basis for each of the Value drivers;
- Value Scoreboard, to measure and monitor the performance of the company relative to the Value Performance Indicators;
- Value Management Office, a governance structure including corporate management and the leadership of the transformation program at the operating levels.

A major industrial group in Colombia launched a wide-ranging Digital Transformation program for its motorbike assembly and distribution division during 2015. As part of their Value Management model, they defined 3 key value drivers:

- Optimize inventory levels and working capital by better aligning their value chain with local demand;

- Increase sales and sales productivity by creating an enhanced purchase experience for their customers;
- Achieve efficiencies within their shared corporate services, introduce risk management tools and reduce lead times for management reporting

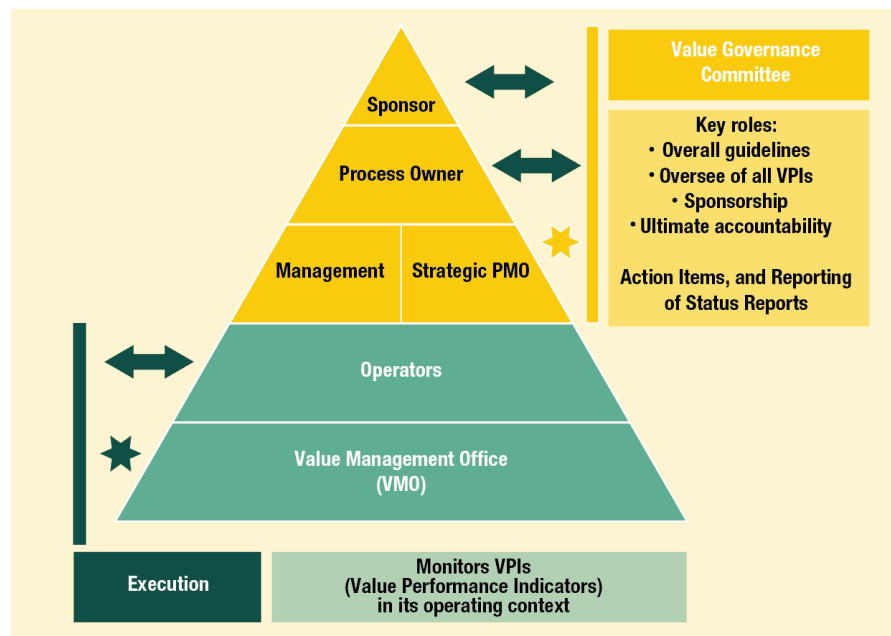
The company developed a Value Management scorecard that set financial goals for each of the 3 value drivers:

- % Internal Rate of Return (IRR)
- Payback period (months)
- Total return (In millions of US\$)
- Total Capital Expenditure (in millions of US\$)

In addition, the sponsors established a governance structure to monitor the project performance, and make the necessary adjustments along the way (see model in figure 24).

Figure 24. Value Management Governance

Source: gA





Business Process Digitization

Digitization is changing the dynamics of the whole of the industrial or services value chain, a phenomenon the market is calling Industry 4.0. The adoption of new usage models of digital technologies is accelerating the integration of the extended enterprise value chain: sourcing, manufacturing, transportation & distribution logistics, and sales operations.

Sales & Operations Management is a good example. “Demand Sensing” is the ability to use digital technologies to create predictive analytical models to adjust and optimize production lines, based on virtual real-time changes in consumer patterns. Customer analytics sensors at the different points of sale capture massive daily volumes of transactional data that are fed into data warehouses. Sophisticated predictive models are used to define changes in patterns of consumers on a daily basis, which in turn are used to adjust inventory levels and productions lines. The integration of Sales and Operations processes contributes to smarter storage locations, optimization of inventories and spare parts, creating better collaboration and increasing financial performance.

The integration of the value chain through digitization is also affecting Demand Planning, Supply Chain Execution and Global Sourcing, through the use of Smart Data, Customer Analytics, Geo localization tools, cloud-

based networks and collaboration platforms. This is especially important in Latin America, where distances between manufacturing plants and consumer hubs are often thousands of kilometers apart. One important Consumer Goods client is using Geo-localization tools and Internet of Things devices to provide online monitoring of very complex logistics systems in Brazil, Mexico and Argentina, ensuring the safety of the fleets at all times, but also integrating the delivery process, reducing time to invoice and optimizing DSO.

We are seeing similar trends of Business Process Digitization in other industries, which are more “services-driven”, as shown in the following examples:

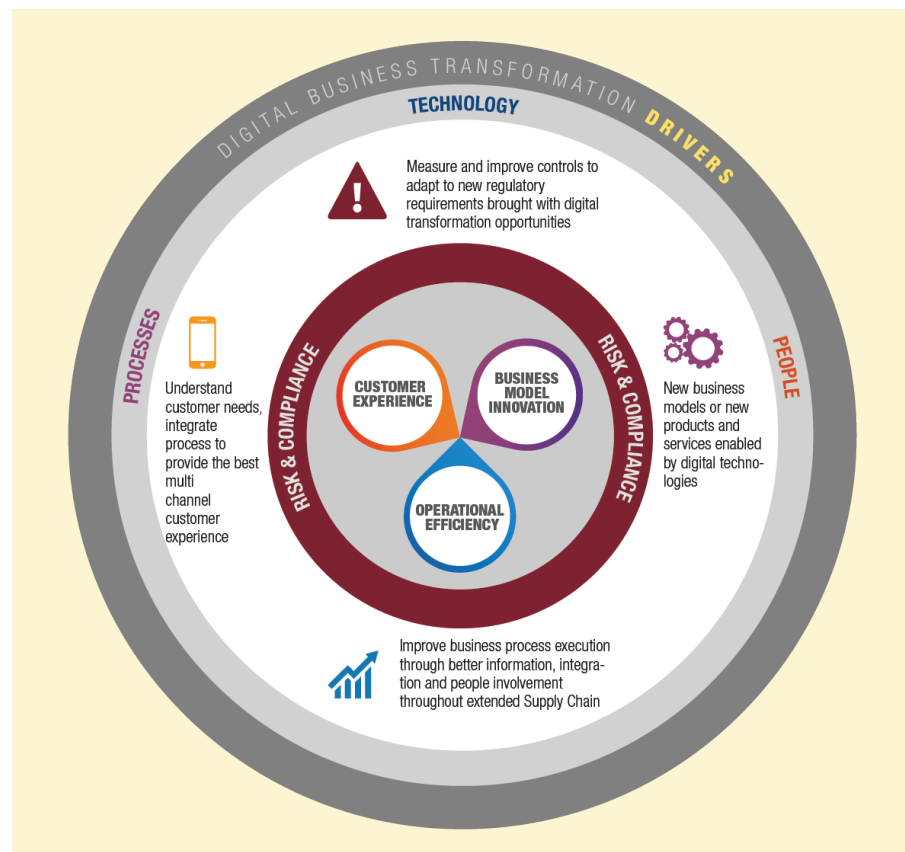
- Life Sciences: New regulations to fight counterfeit drugs are creating the need to serialize and track their products through the value chain until the point of dispensation. To meet lot-level pedigree compliance, companies have 13 data elements that must be incorporated (including the name of the authorized reseller, product quantity, lot number, and container size). The information must be stored and made available to the FDA within 24 hours. Digital tracking systems enabled by serialization are allowing companies to use that data to gain more comprehensive understanding of the entire supply chain and, minimize distribution bottlenecks and manage potential target recalls.



- **Commercial Banking:** The mushrooming of new channels for banking is creating serious challenges for the financial institutions to provide their clients with a single, homogenous (“Omni-channel”) experience. The challenge for financial services technology leadership will be the ability to support an ever-wider ecosystem of processes and applications that enable banking services through smartphones, tablets, wearables and other devices.
 - **Retail:** High turn-over retailers such as supermarkets and drugstores are digitizing their PoS processes and systems using sophisticated tools to extract massive volumes of transactional data on a daily basis, and feeding them into Customer Analytics platforms that in turn interpret the data using predictive models, creating highly personalized purchase patterns.
- The approach to business process digitization is all encompassing, comprising not only the technology but also operations and people (see figure 25).

Figure 25. Building Blocks of Business Process Digitization

Source: gA





A view from Citibank. Highlights from our interview with Jorge Ruiz, Chief Digital Acceleration Officer at Citibank

“Digital Transformation works like a positive virus: several high-speed initiatives impacting the body of the traditional enterprise; the body reacts to the “infection”, transforming and adapting to be prepared for the threat of new entrants and business models”.

“In Transformation, an organization needs to move at two different speeds: the main body of the organization needs to continue to operate normally and gradually incorporate transformation initiatives; but another agile and dynamic organization needs to work in parallel, to drive transformation and make things happen”

“Process transformation versus business transformation: If you are thinking of creating a “new channel” through digital transformation, you’re late. In the digital economy, it’s how you use digital technologies in your core business”

“Digital Transformation is not about increasing revenues, but becoming the most competitive player in the industry: the use of highly specialized apps in a digitally transformed environment can dramatically reduce the marginal cost per transaction. Look at Ali Baba”

“It’s the solution, not the technologies. At Citibank we have reviewed over 1,600 solutions in Fintech, HR Tech, AdTech, and picked 60 of the best and deployed them globally”.



Talent Development

Talent is the fundamental “infrastructure” required for Digital Transformation. People, more than any other resource is the key to a successful digital business transformation. New skills and capabilities are going to be needed to compete in the long-term, but the winners will be those firms that are successful in managing the convergence of strategy, new technologies, business processes and their human capital.

We define talent development as the capacity to groom existing human capital combined with the capacity to find and bring in the new skills where needed. The key Talent areas to think about in the context of Digital Transformation are five:

- **Flexibility:** Digital technologies are evolving at high speed and in very dynamic formats. Therefore, it makes no sense to create cadres of highly focused specialists: they will be outdated in no time. Create flexible professionals, with a strong and well-rounded university education. And then train them for a specific technology, and they will always respond positively. Latin American professionals are well-known for their flexibility and superior ability to innovate
- **Diversity:** To achieve a successful digital transformation team, multiple kinds of skills will be required, including not only IT related skills, but others as Process Innovation, Digital Marketing, Customer Experience and Business/ Financial expertise. Some of these you may need to fetch outside of the company, and in some cases an alliance with a technology boutique or even a tactical acquisition may be the solution.
- **New forms of collaboration and communication:** The digital challenge is not only about individual skills: you need to develop and build new ways of collaboration, to create multi-disciplinary teams, and organize innovation and design thinking workshops. Look deep inside your organization to find the talent you need to compete in the Digital Economy. This is a good opportunity to bring in outside specialists in Change Management, to help produce the necessary changes that are usually hard to do from within.
- **Creative Thinking & Innovation:** Push innovation down into the middle and lower levels of the organization: create innovation anarchy (at least some form of managed anarchy!). Give your staff a free hand: build co-creation interdisciplinary teams, enabling the innovation process, with a collaborative and iterative method to develop and implement the new digital initiatives.



Create the incentives and the rewards to make People Transformation come alive from within. Innovation is about creating something new, but starting from what you already have: Leverage your core assets to create new models, new ways of using technology

- **Create Partnerships with Universities and Research Centers:** In the age of conversation, the digital economy works as a network, connecting businesses, government and academia. Business schools need to connect with companies because they need to remain at the edge of new business practices. Companies need the research and the educational capabilities of the universities to prepare and transform their people.
- **As a case in point:** This research project in itself is a great example of business/academia partnerships: gA and Prof Katz from the Columbia Business School are working together to better understand how Latin American companies are dealing with Digital Transformation.

Innovation and New Business Models

At the core of digital business transformation lies innovation, defined as the ability to rethink competitive strategy, including new products and services, but also new business models, new business processes and markets. Successful companies in Latin America such as *Mercado Libre*, *LAN Lineas Aéreas* or *Natura* are organizations that have built and nurtured strong corporate cultures that promote and create the environment for innovation to happen.

Innovation happens when there is a stimulus for employees to spend time and resources in the development of new products and services, new ways of doing things or creating new working environments. What are the common traits we have seen of innovative companies in Latin America?

- There is a serious commitment from the CEO downwards for innovation to happen: Oftentimes organizations have created a culture of “silos” in their divisions and business areas, hampering passion, intrapreneurship, and self-initiative;
- Innovation happens across the organization, especially in the middle and junior levels, and not in glass cases such as the “Innovation Committee” Some of the more seasoned leaders are appointed as Mentors, offering their experience and guidance to the innovation teams, creating an atmosphere of creative anarchy
- The ability to work with Alliance partners in an open and flexible way, that contribute those skills, capabilities or the scale are not readily available within the firm.



Innovation tools can be used to think about the impact of Digital Transformation on business and competitive environment in a structured way. For example, Design Thinking is a powerful methodology to provide an innovative approach to problem solving that combines empathy, creativity and rationality. By deep diving into the context of your business and competitive challenges, a Design Thinking approach can help define and reframe these issues, creating a very positive environment in which innovation thrives, and identifying the high-priority initiatives that need to be addressed.

Integrating the transformation framework

In the previous sections we described how the technology enablement of both digital and core technologies might enable value creation. But also we explained why those technologies by themselves couldn't create real business value and benefits. A business process innovation approach, as well as talent and organizational management and value management disciplines, is required.

Digital Business Transformation (dBT) framework is a methodology designed to capture that value, to simultaneously manage process, people, value and technology transformation in order to improve operations, provide a consistent customer experience and innovate the business model itself. It is a method designed to transform the company situation, from a present non-digital position (or partially digitized one), to a fully digitally empowered company. And a way to do so discovering the best opportunities and organizing the path through the most convenient digital transformation roadmap.

This framework and capabilities can be compared with an Enterprise Architecture approach. Enterprise Architecture is defined as the framework to "execute the strategy".

According to Michel Porter, 80% of the companies fail to effectively execute their strategies goals. 70% of those cases, the problem are not the strategic vision, but errors in the execution of that strategy. According to Gartner, the effective execution of the company strategy is the most important challenge that organization has to face in the XXI century. And it applies both to company general strategy and specifically to their Digital Transformation Strategy.

Enterprise Architecture is a methodology to analyze, redesign and manage changes to all the components or dimensions of an Enterprise: their processes, their organization, their technologies and applications and data. In that sense, dBT is an extension of an Enterprise Architecture framework, including additional layers to manage People and Talent and to define and manage benefits, value.

The creation, evolution and governance of an integrated Enterprise Architecture are a core component of the intangible capital that an organization needs to achieve the digital transformation.



8. A CALL FOR ACTION

Digital transformation is not for the faint of heart. Unless a company is born digital (as is the case with *Mercado Libre*), the fundamental re-creation of an enterprise is an important process where business assumptions that were defined almost at the firm's inception are put into question, and a new operating model is defined. Along these lines, imitation approaches that merely copy what industry leaders have done in other environments represent a dangerous path. Each company operating in particular competitive environments is a one-of-a-kind system that needs to find the approach to digitization that fits best. Therefore, the reinvention of the digital enterprise is unavoidable and requires considerable effort and management leadership.

This task is not only necessary for the future of the business. The sooner Latin American enterprises tackle this challenge, the earlier our region will be ready to compete at parity with the industrialized world in the digital future. Delaying digital transformation of Latin American economies is not an option if we want to ensure our future growth.



APPENDICES

A. List of surveyed companies

- Arcor (Argentina)
- Axionlog (Argentina)
- Banco Galicia (Argentina)
- Baxter (Argentina)
- Cisco Systems (Argentina)
- Citibank (Argentina)
- Grupo Newsan (Argentina)
- Grupo Peñaflor S.A. (Argentina)
- Hospital Británico (Argentina)
- Johnson & Johnson (Argentina)
- Ledesma (Argentina)
- Mondelez (Argentina)
- San Antonio Internacional (Argentina)
- Swiss Medical (Argentina)
- YPF (Argentina)
- Alelo (Brazil)
- AstraZeneca (Brazil)
- Copersucar S.A. (Brazil)
- CR Bardy (Brazil)
- GRSA (Brazil)
- Grupo SBF (Brazil)
- Kanaflex S/A Indústria de Plásticos (Brazil)
- Livraria Saraiva (Brazil)
- Lojas Marisa (Brazil)
- Magazine Luiza (Brazil)
- MARS (Brazil)
- Mexichem (Brazil)
- Owens Illinois do Brasil (Brazil)
- PepsiCo (Brazil)
- PromonLogicalis (Brazil)
- Sicredi (Brazil)
- Arauco (Chile)
- CODELCO (Chile)
- Derco (Chile)
- Empresas Carozzi S.A. (Chile)
- Empresas IANSA (Chile)
- Kuafmann S.A. (Chile)
- LATAM Airlines Group (Chile)
- RIPLEY (Chile)
- Sigdo Koppers (Chile)
- Zurich (Chile)
- Aje Colombia (Colombia)
- BELCORP (Colombia)
- Caja de Compensación COMFANDI (Colombia)
- Cartones America S.A. (Colombia)
- Ecopetrol (Colombia)
- Fanalca SA (Colombia)
- Farmasanitas (Colombia)
- La Rivera (Colombia)
- POSTOBON S.A. (Colombia)
- RCN Radio (Colombia)
- TERPEL (Colombia)
- AB InBev, Grupo Modelo (Mexico)
- Bachoco (Mexico)
- Chedraui (Mexico)
- Coca-Cola Femsa (Mexico)
- El Palacio de Hierro (Mexico)
- Farmacias del ahorro (Mexico)
- FUNO (Mexico)
- Gentera (Mexico)
- Grupo Turín (Mexico)
- LIVERPOOL (Mexico)
- Mabe (Mexico)
- Maxcom Telecomunicaciones (Mexico)
- Mead Johnson Nutrition (Mexico)
- Pepsico International (Mexico)
- Price Shoes (Mexico)
- Seguros Monterrey New York Life (Mexico)
- Servicios Liverpool, SA de CV (Mexico)
- The Coca-Cola Company (Mexico)
- Toyota de México (Mexico)
- Volkswagen Financial Services (Mexico)



B. Statistics abstract and methodologies

This study comprised two statistical analyses conducted on different data sets. The first one comprised an analysis of National Industrial Census data completed by national statistical agencies of Latin American countries. The second entailed processing data collected through a set of face-to-face interviews of executives of Latin America companies (see names of companies in appendix D). The following appendix describes data sources and methodologies utilized for each analysis.

B.1. Analysis of National Industrial Census

The data utilized for this analysis was collected from the following sources (see table B-1)

Table B-1. National Industrial Census

Country	Source	Agency	Year
Argentina	Nation Survey of Innovation and Technological Behavior	National Institute of Statistics and Census	2006 2008
Brazil	TIC Companies	Regional Center of Studies for the Development of the Information Society	2014
Chile	Longitudinal Survey of Companies	National Institute of Statistics	2013
Colombia	Annual Survey of Manufacturers	National Administrative Department of Statistics	2013
	Annual Survey of Services		
	Annual Survey of Commerce		
Mexico	Economic Survey	National Institute of Statistics and Geography	2013

Each survey compiled data on establishments based on a probabilistic representative sample of firms with more than 10 employees:

- Argentina: 1,675 responses
- Brazil: 7,198 responses
- Chile: 7,267 responses
- Colombia: 16,219 responses
- Mexico: 191,207



Data had to be analyzed at micro-level (by observation) since no census provided the right tabulation for the analysis of digitization. Each survey had a number of questions that were used as components to calculate a digitization index. While the questions were not consistent, it was possible to standardize them in order to create a consistent data set (see table B-2).

Table B-2. Questions in National Industrial Census

Question	Argentina	Brazil	Chile	Colombia	Mexico
B1: % of businesses using computers	●	●	●	●	●
B3: % of businesses using the Internet	●	●	●	●	●
B6: % of businesses with an Intranet	●	●	●	●	●
B10: % of businesses with a local area network (LAN)	●	●		●	●
B11: % of businesses with an extranet	●	●		●	●
B2: % of persons employed routinely using computers		●		●	●
B12_imal: % of businesses sending or receiving e-mail	●	●	●	●	●
B12_itel: %n of businesses telephoning over VoIP, or videoconferencing		●		●	
B12_imes: % of businesses using instant messaging, bulletin boards		●		●	
B12_iedu: % of businesses using the Internet for staff training		●		●	●
B12_irecr: % of businesses using the Internet for internal or external recruitment		●		●	●
B4: % of persons employed routinely using the Internet	●	●	●	●	●
B12_iif: % of businesses getting information about goods and services online	●	●	●	●	●
B12_igovif: % of businesses getting information from general government online	●	●	●	●	●
B12_igov: % of businesses interacting with general government organizations online	●	●	●	●	●
B12_ibk: % of businesses using the Internet for Internet banking	●	●	●	●	●
B8: % of businesses placing orders over the Internet	●	●	●	●	●
B12_icust: %n of businesses using the Internet for providing customer services	●	●	●	●	●
B12_idel: % of businesses using the Internet for delivering products online	●	●	●	●	●
B5: % of businesses with a web presence	●	●	●	●	●
B7: % of businesses receiving orders over the Internet	●	●	●	●	●



Each question was categorized in terms of a stage of the firm value chain in order to estimate the level of digitization by stage (see table B-3).

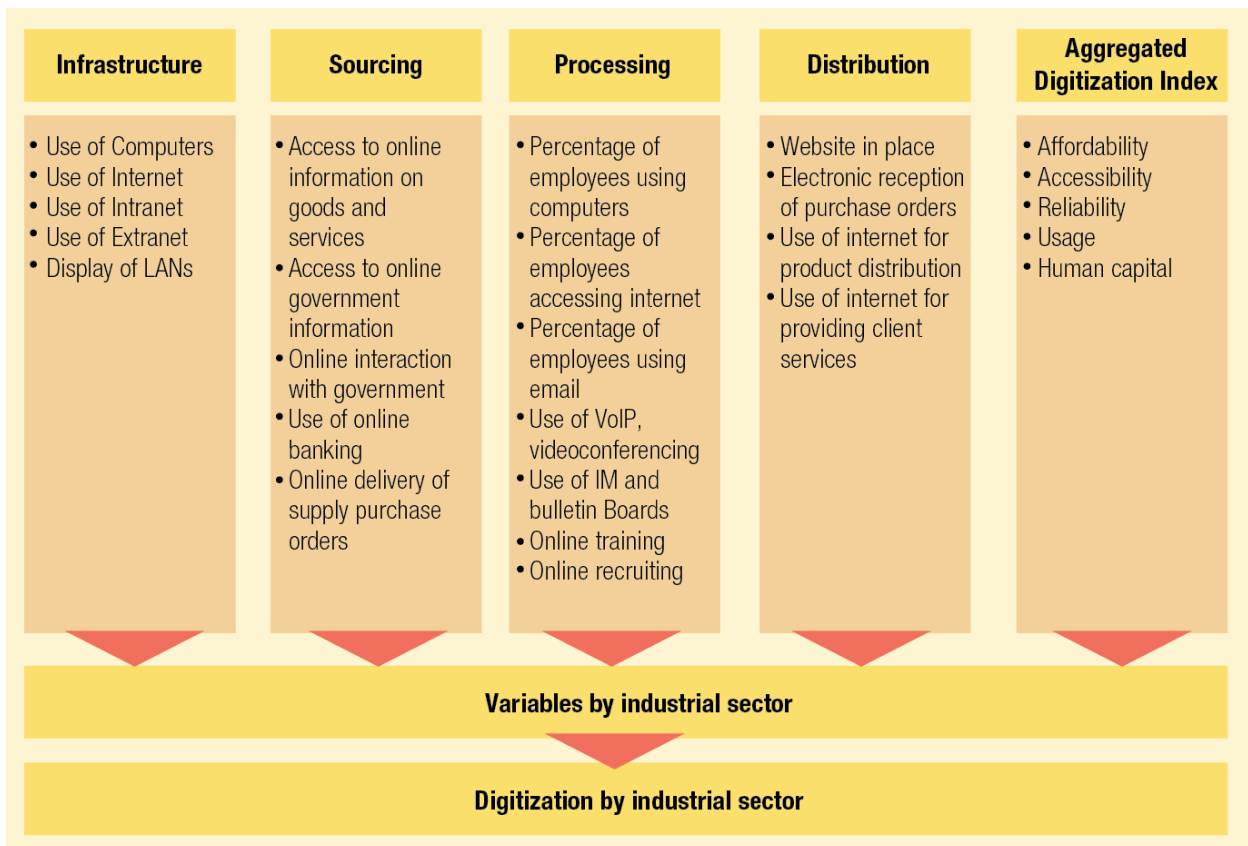
Table B-3. Questions by value chain category

Question	Value Chain Stage
B1: % of businesses using computers	Infrastructure
B3: % of businesses using the Internet	Infrastructure
B6: % of businesses with an Intranet	Infrastructure
B10: % of businesses with a local area network (LAN)	Infrastructure
B11: % of businesses with an extranet	Infrastructure
B2: % of persons employed routinely using computers	Processing
B12_imal: % of businesses sending or receiving e-mail	Processing
B12_itel: %n of businesses telephoning over VoIP, or videoconferencing	Processing
B12_imes: % of businesses using instant messaging, bulletin boards	Processing
B12_iedu: % of businesses using the Internet for staff training	Processing
B12_irecr: % of businesses using the Internet for internal or external recruitment	Processing
B4: % of persons employed routinely using the Internet	Processing
B12_iif: % of businesses getting information about goods and services online	Sourcing
B12_igovif: % of businesses getting information from general government online	Sourcing
B12_igov: % of businesses interacting with general government organizations online	Sourcing
B12_ibk: % of businesses using the Internet for Internet banking	Sourcing
B8: % of businesses placing orders over the Internet	Sourcing
B12_icust: %n of businesses using the Internet for providing customer services	Distribution
B12_idel: % of businesses using the Internet for delivering products online	Distribution
B5: % of businesses with a web presence	Distribution
B7: % of businesses receiving orders over the Internet	Distribution



Once the questions were categorized at the record level in each value chain stage, the digitization index was calculated according to the following methodology (see figure B-1).

Figure B-1. Structure of the Digitization Index by Industry



The digitization index was then calculated for each value chain stage of the following industrial sectors in the following countries (see table B-4).

Table B-4.
Digitization Index
Calculations

Countries	Industrial Sectors
• Argentina	• Mining
• Brazil	• Manufacturing
• Chile	• Health Care
• Colombia	• Retailing
• Mexico	• Financial Services



B.2. Analysis of interview data

The field research comprised 72 interviews of executives of companies operating in Latin America (see questionnaire in appendix B.3). In the case where the company operated in more than one country, the observations collected from a single interview were extended to other countries. As a result, a database of 177 observations was constructed. The surveys were categorized according to the following industry sectors:

- Retailing
- Consumer Products
- Manufacturing
- Telecommunications, Transport & Logistics
- Health & Life Sciences
- Financial Services
- Energy & Natural Resources
- Other

The database by country was split as follows (see table B-5).

B-5. Survey Sample by country

	Argentina	Brazil	Chile	Colombia	Mexico	Total
Retailing	1	5	4	4	7	21
Consumer Products	10	9	9	10	11	49
Manufacturing	7	6	5	6	6	30
Telecommunications, Transport & Logistics	3	2	4	5	3	17
Health & Life Sciences	5	4	3	3	3	18
Financial Services	4	5	3	3	5	20
Energy & Natural Resources	2	3	1	2	2	10
Other	2	2	3	2	3	12
TOTAL	34	36	32	35	40	177

In terms of company size, the sample was split as follows (see table B-6).

B-6. Survey Sample by company size (measured by sales in US\$)

	Argentina	Brazil	Chile	Colombia	Mexico	Total
Less than 100 million	0	1	2	2	1	6
More than 100 but less than 500 million	6	3	4	5	5	23
More than 500 but less than 1,000 million	4	2	3	3	7	19
More than 1,000 million	24	30	23	25	27	129



The cross-tabulation of industry and size of company is as follows (see table B-7).

Table B-7. Survey sample by sector and company size (measured by sales in US\$)

	Total	Retailers	Mass Consumption	Manufacturing	Telecom Transport Logistics	Financial Services	Health Sciences	Energy	Other
Less than 100 million	6	0	0	3	1	0	1	0	1
More than 100 but less than 500 million	23	2	3	9	5	3	1	0	0
More than 500 but less than 1,000 million	19	3	6	2	0	0	0	2	6
More than 1,000 million	129	16	40	16	11	17	16	8	5

The interviews were analyzed in order to generate two different outputs. First, two questions (18 and 20) were used to calculate a digitization index by value chain stage:

18. For the following areas, identify the stage in which digital transformation projects are today at your company?
 - a. Sales force effectiveness
 - b. Brand and marketing
 - c. Supply chain management
 - d. Manufacturing
 - e. Process integration and automation
 - f. Risk and compliance
 - g. Finding, developing and retaining talent
20. For the following technologies, identify the degree of adoption achieved by your company
 - a. Cloud based infrastructure
 - b. Cloud based applications
 - c. Mobile technologies for customer engagement
 - d. Customer analytics
 - e. Digital marketing
 - f. Social business
 - g. Internal social networking
 - h. Internet of Things
 - i. Wearable computing
 - j. Real time monitoring of operations
 - k. Crowdsourcing



The answer of Question 18 serves to estimate the level of digitization at the value chain stage level. For this purpose, responses were aggregated and coded following a sequence, where each answers was coded according to the following sequence:

- Already implemented: 100
- Defined but not implemented: 50
- In the process of definition: 25
- Do not have: 0

Once coded, the answers were grouped to yield an index by value chain stage. For this purpose, the following aggregation assumptions were made (see B-8):

Table B-8. Question 18: Value chain aggregation assumptions

Response Category	Process
Sales	Distribution
Sales Force Effectiveness	Distribution
Brand and marketing	Distribution
Supply Chain management	Sourcing
Manufacturing	Processing
Process Integration	Processing
Risk and compliance	Processing
Finding, developing and retaining talent	Processing

The answer to Question 20 serves to quantify the level infrastructure digitization. Responses were coded as follows:

- Already implemented: 100
- Defined but not implemented: 50
- In the process of definition: 25
- Do not have: 0



Once coded, the answers were grouped to yield an index by value chain stage. For this purpose, the following aggregation assumptions were made (see B-9):

Table B-9. Question 18: Technology aggregation assumptions

Response Category	Sub-category of Technology aggregation
Cloud Based infrastructure	Sub-category 1
Cloud based applications	
Mobile technologies for customer engagement	
Customer analytics	Sub-category 2
Digital Marketing	
Real Time monitoring of operations	Sub-category 3
Internet Social Networks	Sub-category 4
Internet of Things	Sub-category 5
Wearable computing	
Social Business	
Crowdsourcing	

Each sub-category of aggregation is calculated by averaging the responses and then added with equal weights. It should be noted that, with equal weight, single technology categories (Real time monitoring of operations, and Internet Social Networks) have higher weight.

At the end of this process, we have calculated a digitization index by value chain stage. The arithmetic average of the digitization level by each of the four stages yields an overall digitization score.

Other questions were coded and aggregated to generate scores to measure a) availability of a digital strategy, b) impact on the business, and c) transformation readiness.



In the case of transformation readiness, four questions were used:

21. From the following statements, select the one that best describes your company's culture and employee readiness for digital transformation
 - a. Digital transformation is part of the company's culture. Employees are engaged in a shared vision and they help to make the vision a reality
 - b. Digital transformation initiatives are siloed and driven by some areas but are not part of the corporate strategy
 - c. There are some specialists identified but it is not part of the company's culture
23. In your opinion, evaluate the level of importance that the following barriers have to digital transformation adoption in your organization
 - a. Lack of skilled human capital
 - b. Not a priority of top management
 - c. Not part of company strategy
 - d. Our IT systems are not prepared
24. Has the company defined a governance process for implementing digital initiatives?
 - a. Yes
 - b. No
25. Have your company defined and established key performance indicators to measure outcomes of digital business transformation initiatives?
 - a. Yes
 - b. No

Coding of answers was constructed as follows (see table B-10)

Table B-10. Coding of Transformation Readiness Answers

Question	Options	Code
21. From the following statements, select the one that best describes your company's culture and employee readiness for digital transformation?	a. Digital transformation is part of company's culture. Employees are engaged in a shared vision and they help to make the vision a reality.	100
	b. Digital transformation initiatives are siloed and driven by some areas but not part of the corporate culture	60
	c. There are some specialists identified but it is not part of company's culture	30
	d. Not prepared. Need to hire specialists / train internal team	0
23. In your opinion, evaluate the level of importance that the following barriers have to digital transformation adoption in your organization	Lack of skilled human capital	100
	Not a priority for top management	75
	Not part of company strategy	50
	Our IT systems are not prepared	25
		0
24. Has the company defined a governance process for implementing digital initiatives?	Yes (24) and Yes (25)	100
	Yes (24) and No (25)	50
25. Have your company defined and established key performance indicators to measure outcomes of digital business transformation initiatives?	No (24) and Yes (25)	50
	No (24) and No (25)	0

Once the questions were coded, the responses were averaged by sub-index, and a general readiness index was calculated.



B.3. Questionnaire

P1. Select Country

Argentina	1
Brazil	2
Chile	3
Colombia	4
Mexico	5

P2. Name of company

P3. Industry

Retail	1
CPG	2
Manufacturing	3
Telecom, Media & Technology	4
Financial Services	5
Life Sciences & Health Care	6
Government	7
Energy & Natural Resources	8
Transportation & Logistics	9
Other	10

P4. Select the countries in Latin America where your company has operations (check as many as apply):

P3A Brazil	1
P3B Mexico	2
P3C Argentina	3
P3D Chile	4
P3E Colombia	5
P3F Other	6



P5. Select the revenue range that best describes the size of your company in Latin America (in US\$ Million)

- | | |
|---|---|
| P4A Less than 100 Million | 1 |
| P4B More than 100 but less than 500 Million | 2 |
| P4C More than 500 but less than 1,000 Million | 3 |
| P4D More than 1,000 Million | 4 |

P6. First name

P7. Last name

P8. Job position

- | | |
|--------------------|----|
| CEO | 1 |
| CFO | 2 |
| CIO | 3 |
| COO | 4 |
| CMO | 5 |
| CTO | 6 |
| Business Unit Head | 7 |
| Country Head | 8 |
| Vice-President | 9 |
| Director | 10 |
| Other | 11 |
| Other Text | |

P9. Email

P10. Privacy Statement

- | | |
|-----|---|
| Yes | 1 |
| No | 2 |



P11. Overall, how would you evaluate the impact of digital technologies on your business?

- | | |
|-----------|---|
| Very high | 1 |
| High | 2 |
| Moderate | 3 |
| Low | 4 |
| No impact | 5 |

P12. From the following statements select the one that best describes the current stage in which your company is regarding the development of a digital strategy:

- | | |
|--|---|
| We haven't defined a digital strategy | 1 |
| In our company digital strategy is somewhat defined | 2 |
| Digital strategy is already defined but not implemented | 3 |
| Digital strategy is already implemented in some areas | 4 |
| Digital strategy is already implemented in a single area | 5 |
| Don't know | 6 |

P13. Who drives the digital strategy at your company? (Choose more than one if apply)

- | | | |
|------|----------------------|---|
| P13A | CEO | 1 |
| P13B | CXO | 2 |
| P13C | Business Unit Leader | 3 |
| P13D | Digital Officer | 4 |
| P13E | CIO | 5 |
| P13F | CMO | 6 |
| P13G | No one | 7 |
| P13H | Other Text | |

P14. From the following statements, select the one that best describes the current priority of digital initiatives in your overall company's strategy:

- | | |
|--|---|
| Currently digital initiatives are not a priority for the company | 1 |
| Digital initiatives are important but top management hasn't paid much attention yet | 2 |
| Digital initiatives are now part of the overall corporate strategy and we have projects in place | 3 |
| Our main digital initiatives have already been released as part of the corporate strategy | 4 |



P15. For the following statements, select the one that best describes your company's performance in developing a digital strategy against your main competitor:

- | | |
|-----------------------------------|---|
| We are ahead | 1 |
| Competitor is ahead of us | 2 |
| Competitor is in parallel with us | 3 |
| Don't know | 4 |

P16. In what percentage could your company's sales increase with adoption of digital transformation?

- | | |
|--------------------|---|
| Sales growth > 50% | 1 |
| Sales growth > 20% | 2 |
| Sales growth > 10% | 3 |
| Sales growth < 10% | 4 |
| No changes | 5 |

P17. For the following areas, rank the potential impact that digital technologies could have in creating value for your organization:

Very Low = 1 Low = 2 Medium = 3 High = 4 Very High = 5

P17A. Sales

P17B. Sales force effectiveness

P17C. Brand and Marketing (digital automation and loyalty programs)

P17D. Supply chain management

P17E. Manufacturing

P17F. Process integration and automation

P17G. Risk and compliance

P17H. Finding, developing and retaining talent

P18. For the following areas, identify the stage in which digital transformation projects are today at your company:

- | | |
|---------------------------|--------------------------------------|
| Already implemented = 5 | Defined but not implemented = 4 |
| In definition process = 3 | Not in scope = 2 Don't know = 1 |



P18A. Sales

P18B. Sales force effectiveness

P18C. Brand and Marketing (digital automation and loyalty programs)

P18D. Supply chain management

P18E. Manufacturing

P18G. Process integration and automation

P18H. Risk and compliance

P18I. Finding, developing and retaining talent

P18J. Other text

P19. Does your company have plans to establish purely digital subsidiaries in Latin America?

Yes 1

No 2

P20. For the following digital technologies, identify the degree of adoption that your company has done:

Already implemented = 5 Defined but not implemented = 4

In definition process = 3 Not in scope = 2 Don't know = 1

P20A. Cloud based infrastructure

P20B. Cloud based applications

P20C. Mobile technologies for customer engagement

P20D. Customer analytics

P20E. Digital Marketing

P20F. Social Business

P20G. Internal social networks

P20H. Internet of things

P20I. Wearable computing

P20J. Real time monitoring of operations

P20K. Crowdsourcing



P21. From the following statements, select the one that best describes your company's culture and employee readiness for digital transformation.

- Not prepared. Need to hire specialists / train internal team 1
- There are some specialists identified but it is not part of company's culture 2
- Digital transformation initiatives are siloed and driven by some areas but not part of the corporate culture 3
- Digital transformation is part of company's culture. Employees are engaged in a shared vision and they help to make the vision a reality. 4

P22. In your opinion, what is the level of importance that the following aspects have when implementing a digital transformation project:

- Not important = 1 Low importance = 2 Neither = 3
- Important = 4 Very important = 5

P22A. Having a clear vision of how technology can help achieve competitive advantage

P22B. Well thought-out plan, including defined metrics

P22C. Specialized talent with experience in our industry

P22D. Tight scope control and well executed project management

P22E. Top management engagement

P22F. Cross-silos coordination to avoid isolated digital initiatives

P23. In your opinion, evaluate the level of importance that the following barriers have to digital transformation adoption in your organization:

- Not important = 1 Low importance = 2 Neither = 3
- Important = 4 Very important = 5

P23A. Lack of skilled human capital

P23B. Not a priority for top management

P23C. Not part of company strategy

P23D. No clear benefit (lack of a solid business case)

P23E. Our IT systems are not prepared

P23F. No clear responsibility inside the company



P23G. More risks than benefits

P23H. Lack of vision from IT

P23I. Independent silos, no coordination

P23J. Resistance to change

P23K. Regulatory concerns

P24. Has the company defined a governance process for implementing digital initiatives?

Yes	1
No	2
Don't know	3

P25. Have your company defined and established key performance indicators to measure outcomes of digital business transformation initiatives?

Yes	1
No	2
Don't know	3

P26. From the following business outcomes, select the one that have higher impact when selecting digital transformation initiatives for your company:

Operating cost reduction	1
Revenue increase	2
Performance increase	3
Higher profitability	4
Growth in market valuation	5
Increase brand value	6
Increase human capital retention	7
Don't know	8

P27. From the following statements, select the one that best describes the link between digital transformation outcomes and incentives in your company:

There are no incentives of any kind tied to digital business transformation outcomes	1
There are monetary incentives for digital business transformation outcomes	2
There are awards and no-monetary incentives for business transformation outcomes	3

P28. Interviewer final comments



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