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MEASURING AFRICAN WORKERS' AND INDUSTRIES DIGITAL READINESS: PILOT INITIATIVE IN SUB-SAHARAN AFRICA

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MEASURING AFRICAN WORKERS' AND INDUSTRIES DIGITAL READINESS: PILOT INITIATIVE IN SUB-SAHARAN AFRICA

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I. INTRODUCTION

Developing country labor markets have major challenges as economies digitize. Most developing country workers have limited technical skills, which arrests their incomes and adaptability to employees' rapidly changing needs. Developing country workers' returns to education and work are low – an additional year of schooling or working increases developing country workers' incomes less than it would in advanced nations. There are severe labor market mismatches in developing countries, such that human capital is not sorted optimally into jobs where it provides the highest return.¹ Data on workers' skills and abilities are limited, making it harder for companies to identify and match job candidates and current employees to best-fit jobs and for governments and businesses to tailor skills development programs that are most impactful in different segments of the population.

Nowhere are these challenges as great as in Sub-Saharan Africa. Most of Africa's human capital is underprepared and poorly utilized. Some 75 percent of sub-Saharan Africans of ages 20-29 have not completed secondary education; returns on each year of work in sub-Saharan Africa are 30-65 percent lower than in best-performing advanced nations; and about 50 percent of sub-Saharan African young workforces are mismatched to their jobs, being either over- or underskilled for the work they do. Part of the problem is outright nepotism; however, there are also significant informational challenges that limit the talent from sorting to the right jobs. Employers habitually receive applicants that are not good fits for job openings employers post; applicants face challenges in finding the right opportunities and moving to pursue them; and employers face time and informational constraints to fully screen and identify the right fits from among hundreds of thousands of applicants.

These challenges also impact Africa's ecommerce sector, a promising sector for the region's economies to create new jobs and new efficiencies. African ecommerce companies such as marketplaces and online sellers that look for talent do not find it, in part because of the talent pool is small to begin with, and in part because of informational asymmetries and inefficient matching techniques that impede workers from identifying suitable job openings. In addition, jobs in ecommerce companies, and jobs in digitizing businesses in general, predominantly require so-called soft skills – cognitive abilities, critical thinking, and social and communications skills – that enable employees to quickly adapt to new demands, leverage new technologies, and innovate. Studies suggest that these types of skills and aptitudes are among the most critical determinants of countries' labor productivity.² While soft skills are highly correlated with educational attainment, the specific types of soft skills are difficult to convey through conventional recruitment methods such as CVs and interviews. Rather, they tend to be more discernable once the person actually starts working and interacting with peers in the new environment.³

The challenges for Africa's digitizing firms to find and hire the right "fits" cause unnecessary inefficiencies and transactions costs to job candidates, firms, and economies, and pose a major public policy challenge to regional governments. Solutions are also elusive, especially due to significant data gaps on the supply and demand of soft skills and aptitudes in African labor markets. While policymakers have strong data on current occupations in labor markets and measurements such as years of schooling by segments of population, data are very limited on (1) the skills and aptitudes that are key to success in digital economy jobs; (2) the supply of these skills in the African labor force and different sectors; (3) the

rapidly changing demands and occupational profiles in labor markets; and (4) readiness of the supply to meet the demand.⁴

How to then identify what types of skills exist in the region's labor markets and how well they service employees' current and future needs? How to ensure that employers can identify and hire best-fit talent for their job openings? And how to ensure policymakers and business leaders have an accurate sense of the readiness of different segments of African workforces for today's and tomorrow's digital economy jobs and to drive digital transformation of sectors?

The purpose of this report is to start answering some of these questions by reviewing the results of a large-scale data and lessons-learned from an online survey measuring the cognitive abilities and skills of 27,216 Nigerian students and employees across a wide range of sectors, performed by the Jobberman employment portal of Ringier One Africa Media (ROAM) using the survey template from PeopleTree on 1 March-30 September 2021. This tool has previously been employed by large organizations that want to understand the composition of talent within their ranks and identify ways to match workers better to jobs. Here, we test the applicability of the data and methods to understanding the skills and aptitudes of workers across firms and sectors. The pilot project and this report are supported by U.S. Agency for International Development (USAID) and the USAID-supported public-private Alliance for eTrade Development II of which ROAM forms part, with 11 other companies.

The result was a ranking of 60 competencies per survey taker, grouped in 18 major characteristics or archetypes. The respondents further self-selected into one of five groups depending on how they engage in digitization and ecommerce, such as whether they identify and develop ecommerce strategies or support customers in onboarding to a digital environment. The survey also captured each individual's age, gender, sector, occupation, geolocation, educational attainment, and income level.

These rich data can have for various applications, such as to:

- Inform the individuals taking the assessment about their skills and aptitudes and the work environments for which they are best suited;
- Enable employers in the Nigerian ecommerce sector to understand and visualize the skills and aptitudes of that exist in their own organizations and identify mismatches between individuals and their jobs; and develop workforce reskilling strategies;
- Inform Nigerian policymakers about the skills and aptitudes that exist in the country's economic sectors and overall labor market, especially among the youth; which skills and aptitudes are particularly prevalent in digital businesses; and to what extent the current skills and aptitudes of informal online sellers might restrain firms and economic sectors' digital transformation; and
- Enable public and private sector stakeholders learn about the potential of scalable online platforms to capture policy-relevant data on an ongoing basis to help shape and monitor training, learning, and educational policies around the country.

There are also some limitations to the data – most immediately there may be limitations to cross-sectoral comparisons due to sectors’ unique human capital needs. Critically, to gauge the match of talent to jobs, the data on the supply of talent would ideally be matched against data on demand for talent – and demand for specific archetype employees – among Nigerian employers.

The next section reviews the state and challenges in sub-Saharan African workforce development labor markets, including data challenges that impede targeted and scalable skills development and job matching. Section three discusses the methodology employed here to bridge these challenges and details our findings. Section four concludes, with discussion on future research.

II. STATE AND CHALLENGES IN SUB-SAHARAN AFRICAN WORKFORCE DEVELOPMENT AND LABOR MARKETS

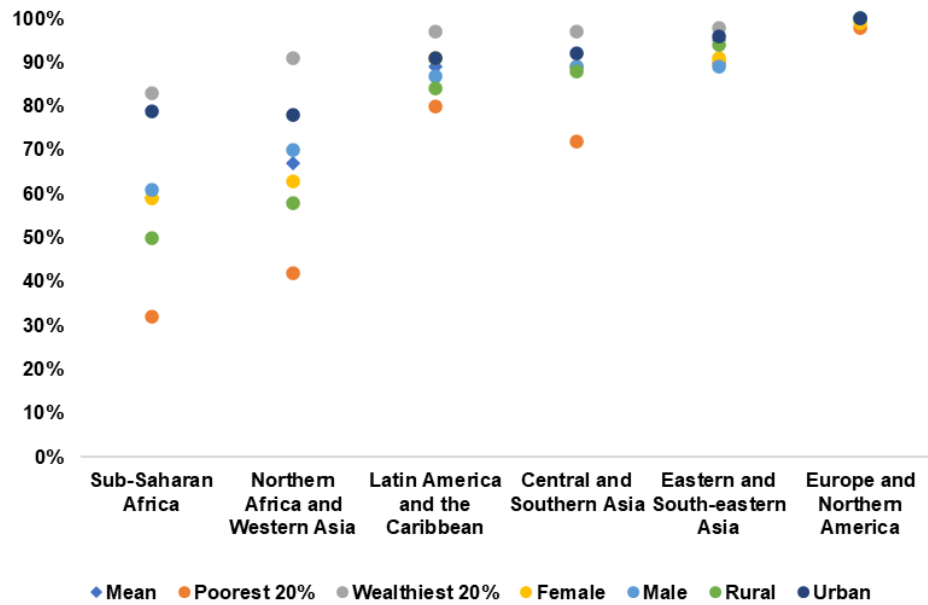
African schools are not preparing workers for the 21st century. While there are pockets of technological excellence for example in Nairobi, Lagos, and Cape Town, overall, the region's human capital trails that of global leaders in technology and innovation – the United States, Israel, Korea, Finland, Germany, and others. These technology-driven economies have entered into a virtuous cycle where workers learn to apply technologies and reap greater returns from education and work. African labor markets have five broad challenges:

- **Low skill levels.** According to employers in many African countries, the continent has a large gap between the skills that firms demand and those that schools and universities supply.⁵ Over 40 percent of firms in Tanzania and 30 percent in Kenya identify lack of skilled labor as a major constraint.⁶ There are also growing concerns as to whether African workers have the skills to adjust to technology-driven changes in occupations in labor markets.

Granted, African governments have made strides in investing 20 percent more in tertiary education than other developing nations and increasing secondary and tertiary enrollment rates – for example, a majority, or 59 percent, are expected to complete secondary school in 2030. However, employers still perceive educational outcomes as inadequate for their needs. Globally, there is a shortage of some 40 million high-skill workers and surplus of some 89-94 million low-skilled workers (people with no post-secondary education); most of the latter are in Africa.⁷

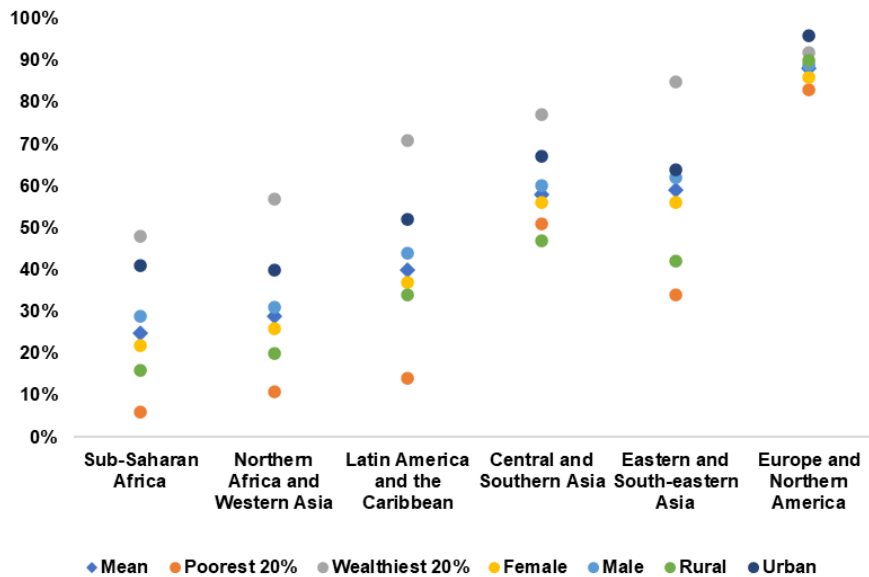
- **Limited years of schooling implies low returns to education.** Every year of education is estimated to add on average 9 percent into a worker's hourly earnings; these private returns to tertiary education are even higher, about 15 percent.⁸ These gains are elusive in sub-Saharan Africa where a large share, or 21 percent, have less than 4 years of schooling – 39 percent of the poorest segments have less than 4 years of schooling. Primary and secondary completion rates in sub-Saharan Africa are lowest in the world at 59 percent and 25 percent, respectively; the poorest and rural populations have the lowest completion rates (figures 1 and 2). Some 19 percent of Africans of primary school age do not go to school, compared to fewer than 2 percent in Europe and North America.⁹ 9 million girls in Africa never go to school. In addition, each year of schooling in Africa has lower returns on education than in advanced economies because the quality and technology-utilization in education in Africa is much lower.

Figure I – Share of Population by Primary Completion Rates among 20-29-Year Olds, by Income Group, Location, and Gender, and World Region



Source: UNESCO.

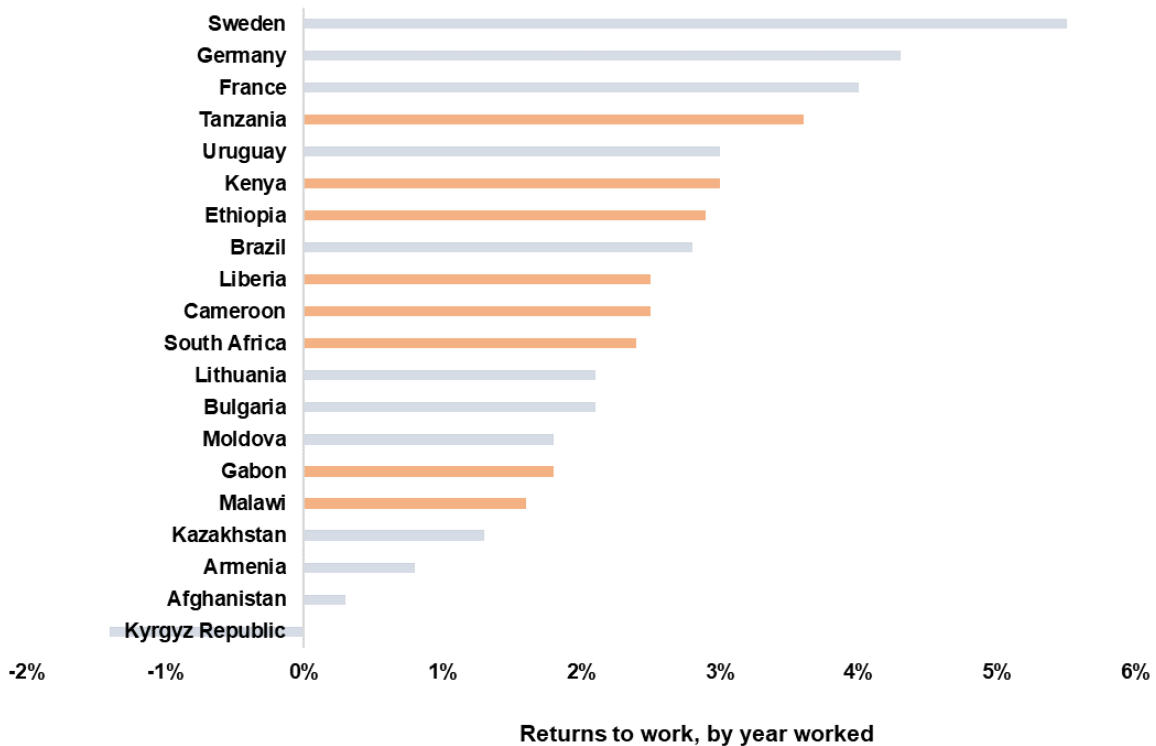
Figure 2 – Share of Population by Upper Secondary Completion Rates among 20-29-Year Olds, by Income Group, Location, and Gender, and World Region



Source: UNESCO.

- Returns on work trail those of advanced nations.** The low educational attainment has severe repercussions on African workers. In general, working has a return: each year an employee spends acquiring new skills, ideas, experience, discernment, and contacts are reflected in the employee's salary. However, the returns to each year worked are in most African economies much lower than they are in advanced economies. For example, in Sweden, one additional year of work raises wages by 5.5 percent, while in Africa's best performer Tanzania the rate is 3.6 percent. The returns on work are 2.9 percent in Ethiopia and 2.5 percent or lower in such economies as Cameroon, South Africa, and Malawi (figure 3).¹⁰ One reason is African workers' low skill levels that undermine their adoption of new technologies; another reason is that that 70 percent of sub-Saharan African workers are in the informal sector where access to productivity-enhancing technologies is limited.¹¹ For example, in Chad, 81 percent of people are estimated to be occupied in the informal sector; in Senegal, the share rises to 89 percent and in Côte d'Ivoire to 91 percent.¹²

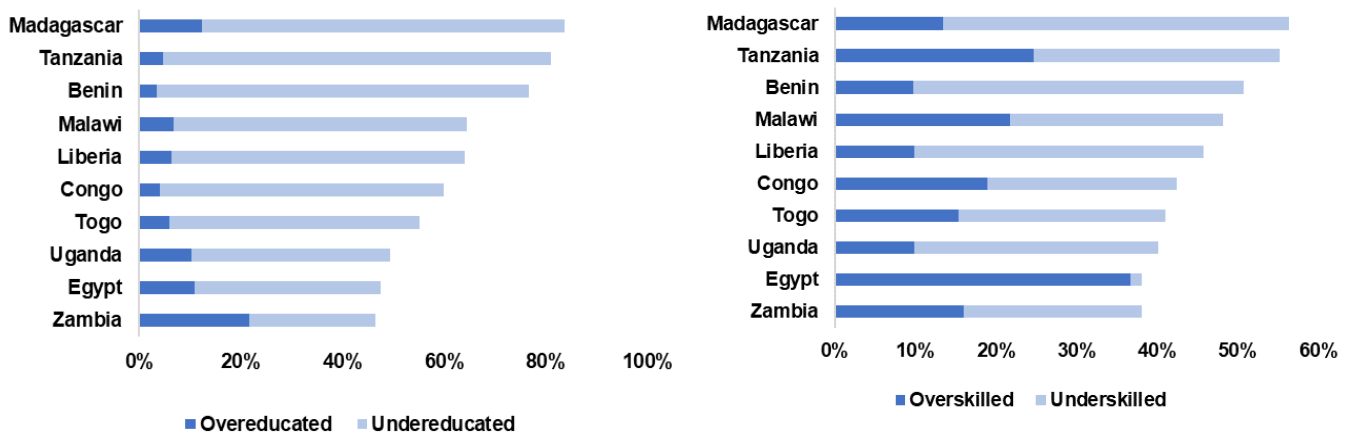
Figure 3 – Returns to Work, Selected Economies



Source: World Bank World Development Report 2019.

- Workers are mismatched to jobs.** Africa’s labor markets are mismatched, meaning that talent is not being sorted into the right opportunities where it would provide the greatest return – within firms, across firms and in the economy. In one study, some 29 percent of African youth are under-skilled and 18 percent over-skilled for the jobs they do, and 8 percent, more often women than men, are overeducated, and 57 percent are undereducated (figure 4).¹³ The low productivity of African firms can owe to both their informality but also to misallocation of labor.¹⁴ There are a number of potential reasons for such mismatches, such as that the supply and demand never meet – employers job posting never reaches the best-fit; rigidities in labor markets that make it difficult to fire an ill-fitting person; limited labor mobility within countries or across them for example due to financial or personal risks of moving; gender discrimination where well-prepared women are discriminated against and offered jobs where they are over-skilled; or nepotism or other practices that may cause an ill-fitting person to be hired; and simply employers’ limited knowledge *ex ante* as to what skills and aptitudes a job actually requires and who the right candidate for a job is. The costs of mismatches are foregone earnings and job satisfaction among over-skilled persons. The notion that well-educated workers become over-skilled employees can also undermine young people’s interest in education. The poor allocation of human capital of course also costs economies.

Figure 4 – Educational and Skills Mismatches in African Labor Markets, Selected Economies



Source: Horsy and Mukasa, “Youth Jobs, Skill and Educational Mismatches in Africa,” African Development Bank working Paper Series 326, November 2019.

- Limited adaptability of supply in labor markets to the changing demands in the digitizing firms.** The rapid pace of change in labor markets has put a premium on skills and abilities conducive to adaptation. For example, in the United States, there is a particularly significant premium on jobs that require high levels of cognitive and social skills.¹⁵ Jobs that require high levels of social and math-intensive skills like management analysts and physicians have experienced particularly strong wage gains.¹⁶ These, studies suggest, are the types of skills

that help workers more easily learn and adapt and thereby able to “leap” from one occupation to the next as jobs change and new demands emerge. Some studies indicate that the kinds of broad and transferable skills and cognitive abilities taught in U.S. universities are found to enable workers to transition into new jobs as labor market demands and occupations transform.¹⁷ Workers’ adaptability is difficult to measure but when measured, it is found to be highly correlated with the OECD’s Program for International Student Assessment (PISA) results in science, mathematics and reading.¹⁸ A worker’s ability to leap to new jobs also improves with the diversity of labor markets – as such markets are likelier to contain larger numbers of jobs that are closely related to the ones a person holds.¹⁹ Adaptability is not only relevant to high-skilled jobs: as firms digitize, even lower-skilled jobs can require advanced technical, social, creative, and cognitive skills.²⁰

- **Globalization of work.** Ongoing internet-driven globalization of labor markets is both a great opportunity and challenge for Africa. It is an opportunity because advanced country companies can outsource talent from Africa at lower cost than they would pay for workers in France, Korea, or the United States. In addition, online job platforms such as Fiverr, Freelancer, and Upwork open great opportunities for African workers to do various types of tasks such as website development, database build out management, copyediting, programming, and so on. McKinsey has projected that such online job marketplaces could offer 540 million jobs by 2025 and shorten the time for workers to get rehired.²¹ However, the globalization of labor markets is also a challenge for African economies given workers’ limited preparation for high-skilled jobs. African workers compete head-on with people in other developing markets such as Bangladesh and India that have deep pools of workers for both low-and high-end digital economy jobs at similar price points.

Measurement Challenges of Required Skills and Labor Market Mismatches

Improving African workers’ readiness for the digital economy requires an accurate measurement of current and future supply of and demand for talent for digital economy jobs in the labor market. This however is challenging. Not only are there good indicators; there are also methodological challenges. For example, occupational categories are often not the best indicators – any one occupation can require many skills, and the skills required for an occupation typically change over time – and entire occupational categories may be decimated and born. Perceptions-based studies have their challenges. For example, studies have often sought to understand skills mismatches by asking employers and employees about skills that are required for a job.

However, asking employers about the skills their employees have, or that are required for different jobs, assumes that employers have a clear view of skills in their organizations and the skills required for any one job. Meanwhile, employees’ assessments of the match of their own skills and their views on the skills needed for their jobs are biased as employees tend to overestimate their own skills and the match of their skills to the work they are hired to perform. The challenges of measurement of skills and aptitudes and the productivity of different types of workers is exacerbated in economies with large informal sectors, where there are challenges to measure even the number of people in an occupation or a sector and the hours people actually work in an occupation.²²

These challenges are quite universal – but they are also gradually being overcome through new applications. For example, leading companies have leveraged sophisticated technologies to quickly screen jobs applications, identify candidates' skills and aptitudes, and optimize matches between candidates and positions. As an example, IBM uses artificial intelligence to go through three million job applications each year, infer key attributes and skills from the text in candidates' CVs, present candidates with several job opportunities that he or she might be qualified for, and match candidates to the right jobs.²³ LinkedIn's AI services help employers assess the quality of the technology talent pool in a geography where the employer looks to open an office. These types of approaches have also been used in Africa. For example, Ethiopia's iCogs Lab helps poor people construct their first CVs based on the oral histories of their work experiences, and helps match them into new jobs close to their homes so they will not exhaust their earnings on public transport.²⁴

These and other advances in big data and machine learning will be increasingly important to help firms identify good candidates and predict candidates' future performance in a job. These technologies are however still very under-utilized for public policy purposes, to understand demand and supply of talent in labor markets, define workforce development programs, and interventions, reduce mismatches, and assess their outcomes.

This paper explores ways to bridge this gap by piloting and reporting on a scalable approach to understand skills and aptitudes in the Nigerian labor market and the extent to which these are appropriate for the demands of the digital economy. This is to lay the groundwork for development of skills development programs that develop and identify suitable talent for the Nigerian e-commerce sector.

III. DATA AND FINDINGS

The purpose of the ROAM and PeopleTree data was to seek to understanding skills and aptitudes supplied in the Nigerian ecommerce sector and broader economy by using a comprehensive skills and aptitude assessment with over 27,216 Nigerians, and, in particular, to learn:

- Whether there are empirical regularities between the skills and characteristics and observable variables such as occupations (such as technology-intensive jobs), sectors (such as ecommerce-related sectors), regions, and firm size;
- Which sectors are susceptible to a successful digital transformation – is there a set of skills and characteristics required for digital transformation across sectors; and
- How prepared are young workers and students for jobs in the digital economy – do young professional students have the skills and characteristics that professionals thriving in the digital economy and companies have?

The goal here has not been to arrive at definite answers but rather to explore the usefulness of the database for understanding the skills gaps and mismatches and skills needs in the Nigerian workforce for the digital era.

This data build on the many recent studies that assess the skills requirements of different tasks and occupations.²⁵ While interest in skills and aptitudes suitable for the digital economy has grown significantly, there are still few applications like our, to leverage data from online talent platforms such as LinkedIn for economic and policy research.²⁶ The studies that do exist, however, have been highly promising of the power of online platforms in offering granular data on supply and demand of skills and aptitudes in labor markets. For example, Amaral et al (2018) usefully operationalize LinkedIn data to understand changes in occupational profiles in Latin America and workers' potential to leap into a growing job category.²⁷ However, to our knowledge research using massive data from online talent platform and job portals is very limited in Africa; World Economic Forum (2017) shows some descriptive statistics based on LinkedIn data for Africa.²⁸

A. METHODOLOGY

The pilot involved an online, 60-question of a 30-minute survey, TalentPrint's Talent Genome© competency model, developed by Peopletree Group.²⁹ Figures 5 and 6 map out the surveyed individuals by gender and income and gender and schooling; figures 7 and 8 maps out the sample by sector and size of firms where they work and their occupations, respectively. Table I maps out the 18 characteristics or archetypes developed by PeopleTree; these characteristics come together from a forced ranking of 60 competencies for each survey taker.

Figure 5 – Number of surveyed individuals by highest degree attained and gender

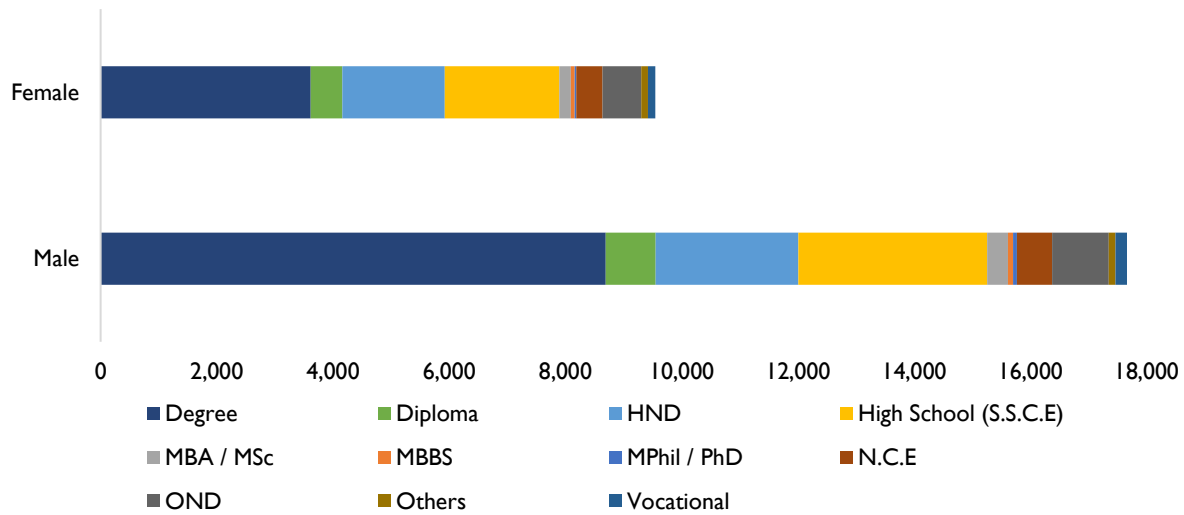


Figure 6 – Number of surveyed individuals by income and gender (those who declare income only)

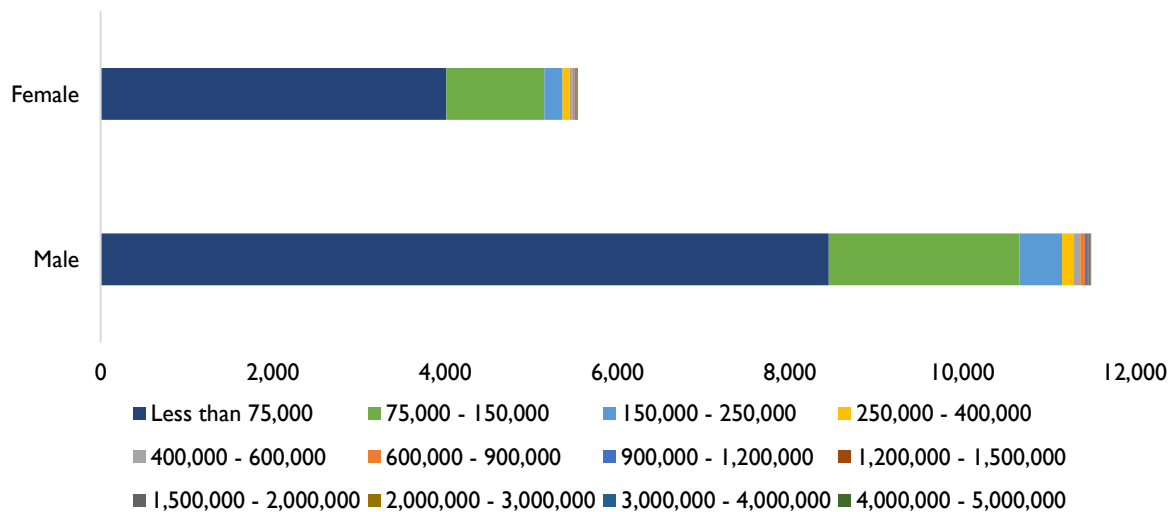


Figure 7 – Number of surveyed individuals by industries and firm size

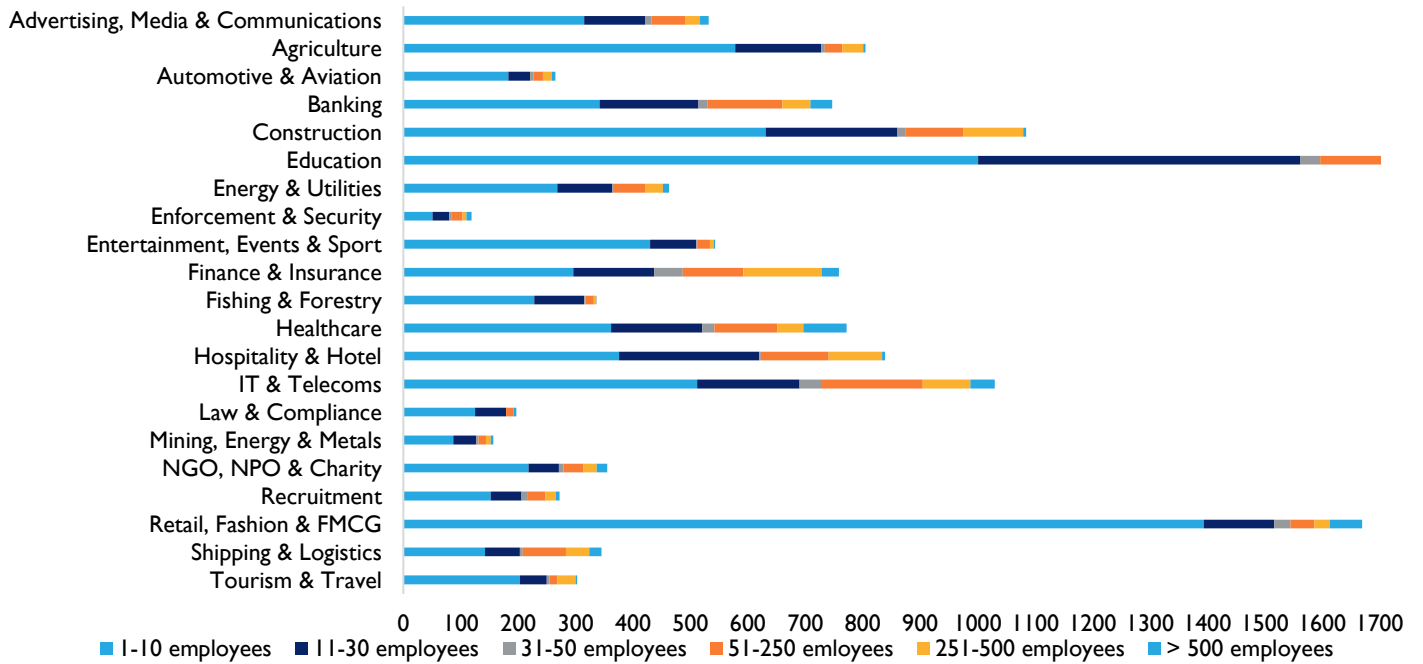


Figure 8 – Number of surveyed individuals by industries and occupations

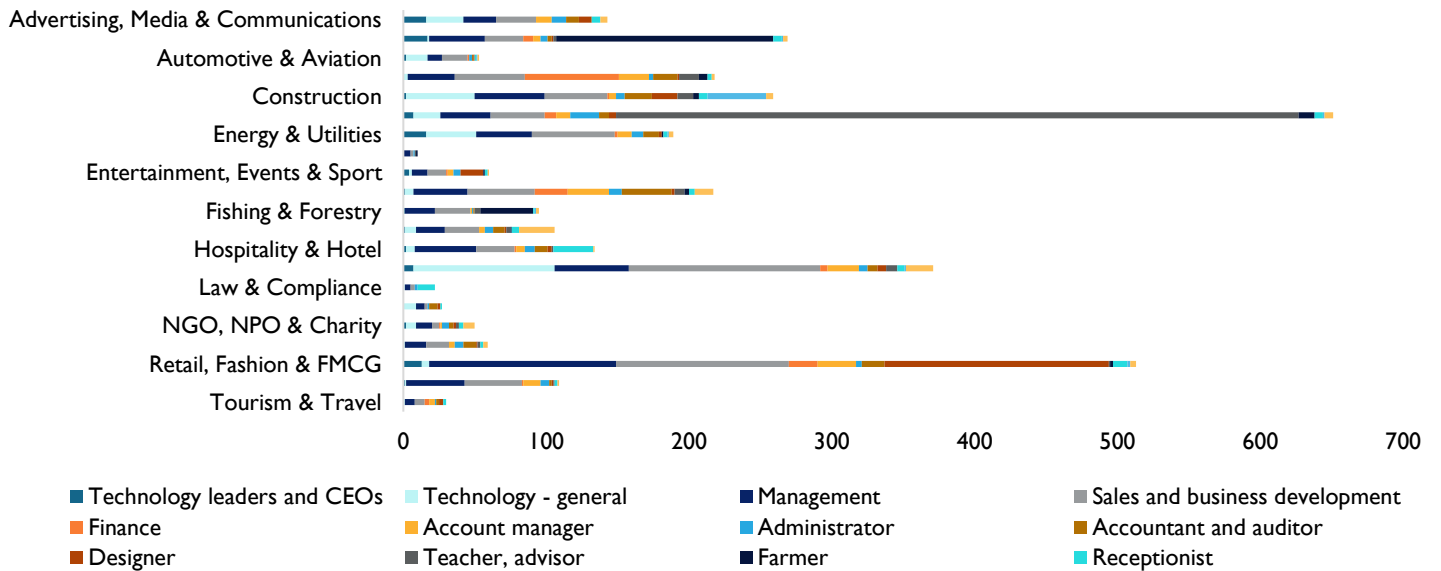


Table I – 18 Characteristics Mapped for Each Respondent on a Scale of 0 to 100

01 - The energetic driver

Consistently achieves results and meets goals and targets

Is motivated to achieve career advancement

Sticks to a course of action despite obstacles and sees things through to the end

Takes initiative and demonstrates a positive can-do attitude

02 - The flexible character

Adapts behavior to the interpersonal style and needs of others

Is open to feedback and aware of strengths and weaknesses

03 - The imaginative mind

Creates many new ideas by seeing new connections between different and sometimes unrelated concepts

Is open to different and sometimes conflicting ideas or concepts and willing to change accordingly

04 - The constant learner

Continuously develops new skills and enhances existing capabilities

Has a good general knowledge and makes an effort to stay up to date with current affairs.

Has the functional and technical knowledge and skills to get the job done

05 - The willing risk taker

Enjoys trying new things and is willing to experiment and take calculated risks

Is comfortable working in a changing and uncertain environment

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Enjoys trying new things and is willing to experiment and take calculated risks

Is comfortable working in a changing and uncertain environment

06 - The big picture thinker

Can deal with complex intellectual and cognitive concepts

Can shift focus away from the details and gain a broader perspective

Can envision future scenarios based on a combination of intuition, trends and data

07 - The conflict confronter

Challenges the status quo and is willing to speak out, even at great personal risk

Recognizes, handles and resolves conflict promptly

Confronts underperformance quickly when individuals fail to meet expectations and takes corrective action

08 - The methodical organizer

Is well organized and methodical, and pays attention to detail

Has a high level of productivity and uses time well to get work done

Sets definite milestones and actions for achieving goals

09 - The sound decision maker

Makes decisions quickly, even in the absence of complete data

Exercises good judgment when making decisions and takes into account both facts and personal experience

Differentiates between critical and less important priorities

Accurately identifies strengths, weaknesses and potential in people with relatively short exposure to them

10 - The people manager

Provides clear objectives and instructions to others

Assigns meaningful and important tasks and responsibilities to others and gives them authority to act

Puts useful and meaningful measures in place to monitor work processes

11 - The social networker

Is cooperative and handles collaboration well

Builds relationships with and delivers services to both internal and external customers, with a focus on their needs

Actively builds and manages social networks both inside and outside the organization

Shares an appropriate amount of personal information so that others can get to know them

Respectful towards authority, and open to corrective feedback

12 - The motivational cheerleader

Develops others and provides an opportunity for them to practice new skills or improve existing ones

Gets others to accept and trust a vision of the future and inspires them

Creates an environment that brings out the best in others and knows what motivates different types of people

Recognizes the value of teamwork and can pull people together for a common purpose

13 - The effective negotiator

Is confident when interacting with others, even those with greater authority

Is tactful and can communicate in a non-confrontational and polite manner

Achieves a win-win outcome even when there are conflicting interests and limited resources

Is aware of and can manage the dynamics of power within an organization

14 - The skilled communicator

Clearly explains a point of view and its reasoning in both one-on-one and large audience situations

Writes accurately and professionally in multiple formats, with the correct amount of detail

Keeps people informed with relevant and well-timed information

15 - The practical fixer

Continuously looks for ways to improve or re-engineer processes

Takes new ideas from conception to fruition by managing the innovation process

Solves challenging problems by using a combination of intuition and analytical thinking

Quickly realizes the impact of new technology and finds opportunities to integrate it into the business to create competitive

16 - The considerate carer

Is friendly and easy to approach

Demonstrates a genuine concern for and interest in others

Listens with the intention of genuinely understanding others' thoughts and feelings

17 - The calming presence

Balances the need to meet work responsibilities with factors that ensure a quality life

Remains calm under pressure

Recognizes the contribution of others and acts humbly about strengths and achievements

Is tolerant with others and knows when to slow down to let them catch up

18 - The responsible citizen

Acts in line with the dominant values of the organization

Treats people fairly regardless of race, gender, cultural differences or personal styles

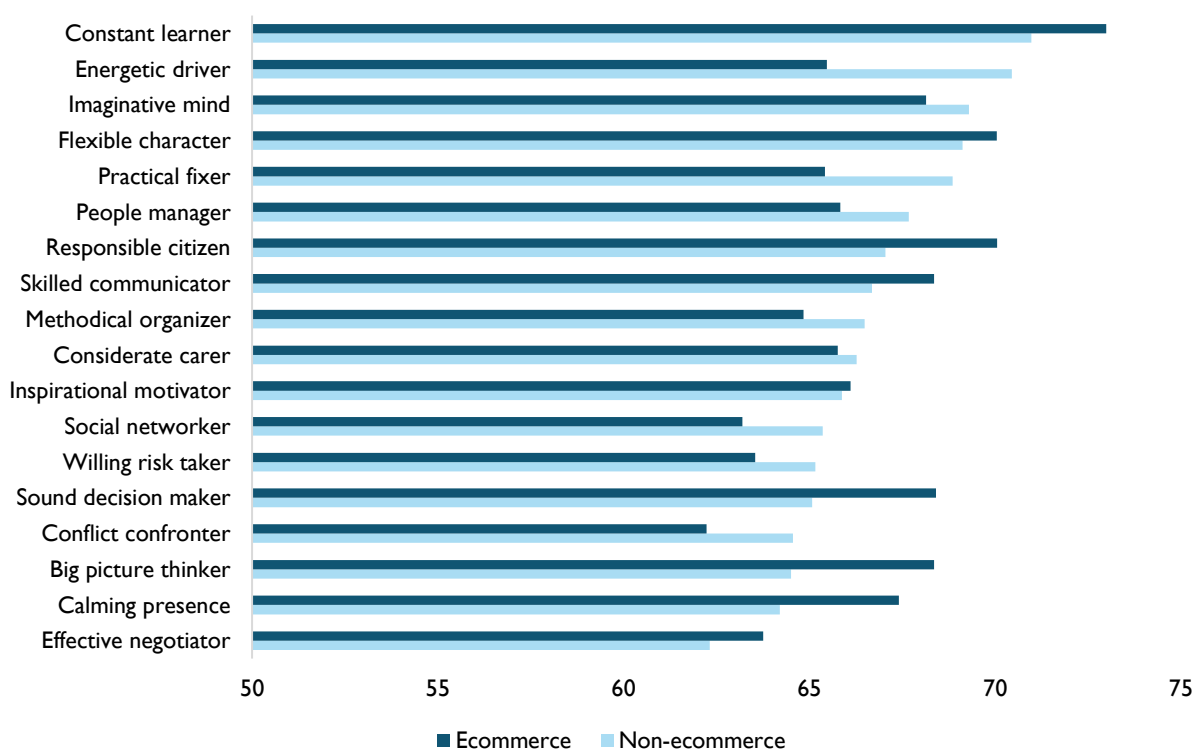
Accepts accountability for all areas of responsibility, even the unpopular or tough ones

Is trusted by others and can be relied on to keep promises and protect confidential information

B. FINDINGS: SOFT DIGITAL SKILLS IN NIGERIAN OCCUPATIONS AND INDUSTRIES

The surveyed were asked to report working either in non-ecommerce or ecommerce companies. There is little meaningful variation in the characteristics of the two sets (figure 9). This is not surprising: there after all are numerous different occupations and skill sets within each of the two groups. Similarly, individuals’ ranking of the 18 characteristics varies to some extent by educational attainment and firm size (appendix I), but provided limited insight as there can be great many occupations, skillsets, and people within the broad educational and firm size categories.

Figure 9 – Average characteristics scores of ecommerce vs. non-ecommerce job holders



A more promising approach is to assess the characteristics by occupations – for example, it could be hypothesized that individuals in certain occupations like administration or accounting would have different characteristics, either innate or acquired, than individuals that are in business development and sales. Table 2 explores this by mapping the average characteristic score by occupation. There are some intuitive patterns – for example, technology leaders and sales and business development staff rank high on “big picture thinker”, sales staff are “energetic drivers”, and account managers that deal with customer demands and requests rank high on “calming presence.”

Table 2 - Characteristics by Occupations

	Technology leaders and CEOs	Technology - junior	Manager	Sales and business development	Financial services employee	Account manager	Adminis-trator	Accountant or auditor	Designer	Farmer	Teacher	Student
Constant learner	77	75	72	73	71	75	70	74	71	70	74	68
Responsible citizen	75	70	70	60	74	73	72	75	67	65	69	67
Skilled communicator	75	66	66	69	65	69	69	73	71	75	67	66
Flexible character	73	70	68	74	70	72	74	69	70	69	67	68
Big picture thinker	72	71	66	75	66	64	61	66	71	65	69	67
Considerate carer	71	64	65	55	68	67	68	64	63	69	64	66
Imaginative mind	71	69	66	72	69	70	68	64	68	71	66	69
Inspirational motivator	67	61	63	63	72	60	72	63	68	68	70	68
People manager	66	63	70	64	70	68	70	64	65	67	65	68
Willing risk taker	64	67	67	65	61	58	66	68	69	62	64	64
Practical fixer	63	69	67	68	65	65	63	62	65	68	67	66
Methodical organizer	63	64	67	68	64	67	64	68	66	66	69	65
Calming presence	62	66	65	59	65	70	65	69	64	61	66	67
Energetic driver	62	70	70	79	70	69	66	64	67	64	67	67
Sound decision maker	62	66	66	70	68	63	66	68	66	67	69	71
Effective negotiator	61	64	63	63	65	64	66	69	65	66	62	67
Conflict confronter	60	57	63	53	59	55	57	58	58	65	64	63
Social networker	57	66	64	67	60	69	64	61	64	63	62	64

The occupational titles provide only one window into what the employee actually does. An individual can perform various tasks and roles in an occupation, and two individuals with the same occupation can perform very different tasks and have very different skills and aptitudes. For example, a recruiter in a bank looking for a person to lead the development of digital lending tools for small businesses may wish to hire a credit underwriter who understands challenges faced by clients but has characteristics of a person who can lead the design of digital applications for the banking sector – as opposed to a credit underwriter with characteristics conducive to helping clients onboard and start using these applications.

This is the first lessons of this analysis: rather than only asking individuals about their titles and occupations, it can be useful to learn about the tasks and roles they perform in their occupations. However, it can of course be that a person is mismatched to the functions he or she is to perform – and this is where a talent assessment as employed here can be especially useful.

What then are the characteristics associated with certain functions, especially functions that are key in the digital economy and ecommerce, for which a person is especially suitable?

The survey sought to address this by asking respondents to assign themselves into groups that capture their engagement with digital technologies and in ecommerce. Some ten percent or 2,554 individuals

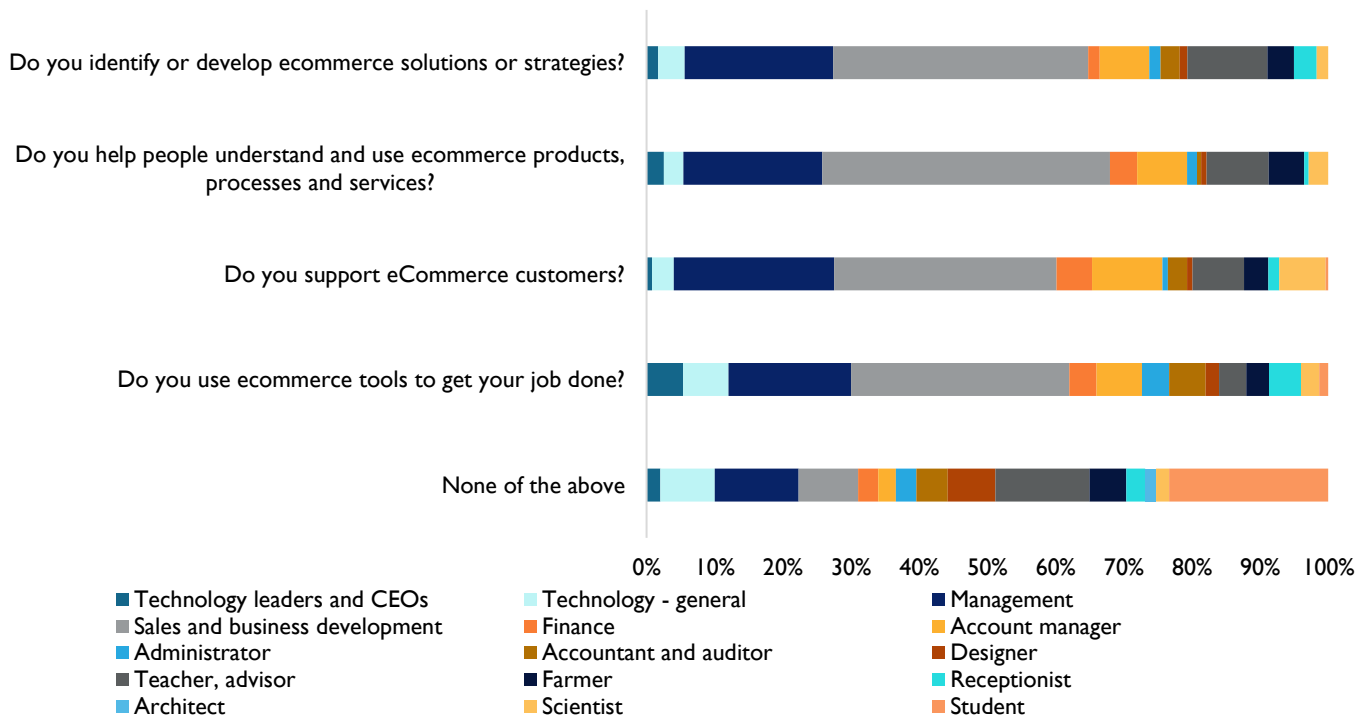
that took the survey assigned themselves into one of four groups – whether they identify ecommerce strategies (16 percent); help others understand and use ecommerce and digital applications (49 percent); support ecommerce customers (21 percent); or use ecommerce tools (14 percent) (table 3). Individuals in the four groups are somewhat distinct – for example, on average, respondents that support ecommerce customers are younger and work in larger firms than respondents that use ecommerce tools or help people understand ecommerce. Respondents that use ecommerce tool to get their jobs done are likelier than the others to work in micro enterprises and be located outside major metropolitan regions, and be women.

Table 3 – Profiles of the respondents by engagement in ecommerce and digital economy

Archetype	% of sample	% of people below 25 years	Firm size: micro	Firm size: small	Firm size: medium and large	Located in Lagos, Imo or Akwa-Ibom	% income >150,000	% of women	% educated abroad	% with Master's, MBA, PhD
1 Identify and develop ecommerce strategies	1%	38%	47%	45%	8%	91%	9%	36%	16%	6%
2 Help people understand and use ecommerce	5%	44%	49%	41%	11%	94%	10%	35%	13%	6%
3 Support ecommerce customers	2%	53%	33%	48%	20%	88%	10%	38%	9%	8%
4 Use ecommerce tools	1%	40%	54%	33%	14%	80%	16%	40%	8%	7%

One immediate finding, and one that again points to the limits of formal titles in the digital era, is that each of the four groups encompass several occupations at similar distributions: for example, persons that are, say, account managers, may perform diverse roles associated with ecommerce (figure 10). Some may identify new ecommerce strategies, others may use ecommerce tools to accomplish their tasks, and still others may support ecommerce customers with requests and ecommerce applications.

Figure 10 – Occupations by individuals’ engagement in the ecommerce sector



Are there then meaningful variations in employees’ characteristics across the four ecommerce-related groups that would enable hiring managers to identify the right talent for a specific job, and policymakers to calculate the workforce’s readiness for ecommerce and the digital economy?

Some intuitive patterns do emerge. For example, respondents that report as their function “identifying ecommerce solutions” score high on the characteristics imaginative mind, methodical organizer, and practical fixer, while those that support people in using ecommerce tools score high on characteristics constant learner, flexible character, and energetic driver (tables 4 and 5). These characteristics may to some extent reflect the distribution of occupations within the four groups: for example, the group that helps others understand and use ecommerce tools has a strong share of sales and business development personnel that also in table 2 ranked high on constant learner, flexible character, and practical fixer. However, in general, the distribution of occupations is similar within the four ecommerce groups.

Table 4 – Characteristics of individuals’ engagement in the ecommerce sector (averages)

	Do you identify or develop ecommerce solutions or strategies?	Do you help people understand and use ecommerce products, processes and services?	Do you support ecommerce customers?	Do you use ecommerce tools to get your job done?	None of the above
Imaginative mind	72	69	69	69	67
Methodical organizer	72	66	66	65	66
Practical fixer	71	69	67	68	65
Considerate carer	70	65	69	66	65
Energetic driver	69	70	70	72	66
Constant learner	69	71	72	74	72
People manager	69	68	68	64	66
Flexible character	68	70	67	71	69
Sound decision maker	67	65	65	63	69
Conflict confronter	66	65	63	62	63
Responsible citizen	66	66	67	71	69
Skilled communicator	65	67	66	70	68
Big picture thinker	64	63	65	67	68
Inspirational motivator	64	67	65	64	66
Social networker	63	66	66	65	63
Calming presence	62	64	67	63	67
Effective negotiator	61	63	63	61	64
Willing risk taker	61	66	65	65	64

Table 5 – Summary of top-3 characteristics by engagement in ecommerce and digital economy

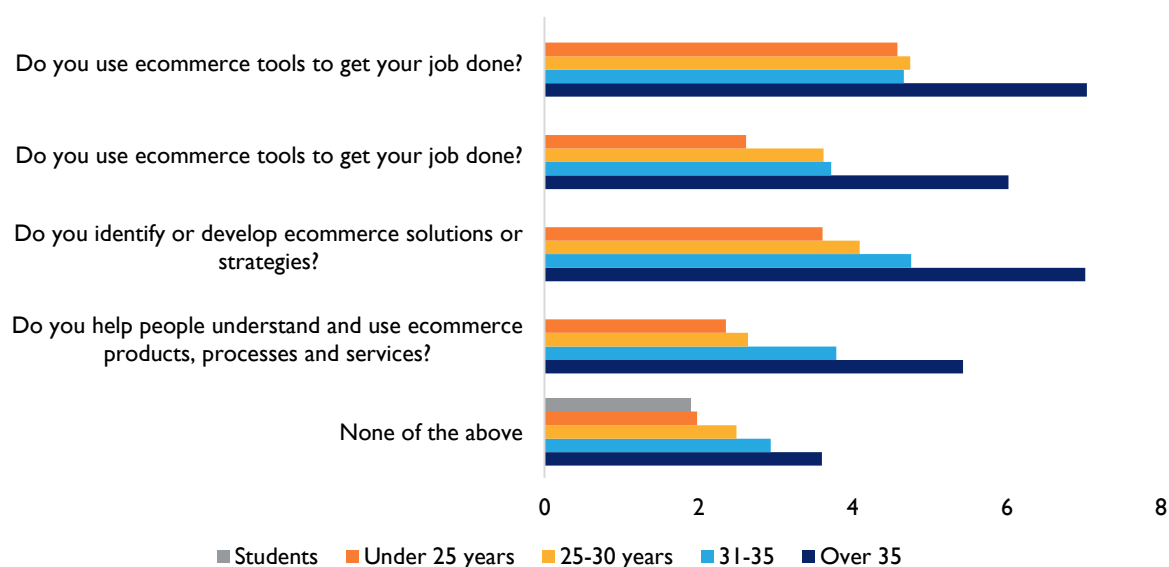
Archetype	Top-3 Characteristics
1 Identify and develop ecommerce strategies	<p>Imaginative minds: Create many new ideas by seeing new connections between different concepts</p> <p>Methodical organizers: Are well-organized and methodical, set definite milestones</p> <p>Practical fixers: Continuously look for ways to improve or re-engineer processes</p>
2 Help people understand and use ecommerce	<p>Constant learners: Continuously develop new skills and stay up to date</p> <p>Flexible characters: Adjust behavior to others' interpersonal style and communication</p> <p>Energetic drivers: Take initiatives and demonstrate positive can-do attitude</p>
3 Support ecommerce customers	<p>Constant learners: Continuously develop new skills and stay up to date</p> <p>Energetic drivers: Take initiatives and demonstrate positive can-do attitude</p> <p>Imaginative minds: Create many new ideas by seeing new connections between different concepts</p>
4 Use ecommerce tools	<p>Constant learners: Continuously develop new skills and stay up to date</p> <p>Sound decision-makers: Exercise good judgement when making decisions, accurately identify strengths in others</p> <p>Responsible citizens: Accept accountability for all areas of responsibility, act in line with dominant values</p>

This type of mapping of characteristics to types of roles in the digital economy and ecommerce can be helpful for hiring managers that want to identify individuals that can, for example, identify ecommerce solutions, say, in a department with dozens of people with the same title. The data can also be useful for younger professionals and students to understand how their skills and characteristics may ideally fit in an organization – for example those that score as energetic drivers may be well-placed to use commerce tools while those that have “calming presence” may find opportunities in supporting ecommerce customers. (This of course presupposes that the surveyed individuals are optimally sorted to their functions).

Could these data then have relevance to policymakers? One policy-relevant question that could be explored with these data is the extent that younger people that are students or making their first inroads into the labor market embody the skills and aptitudes required for the digital economy. The 737 students in the dataset score highest on “constant learner,” “sound decisionmaker,” and “imaginative mind,” but overall the average scores are more similar across the characteristics than they are for more mature workers that have gained experience in the labor market: students score steady 64-65 in each characteristic. In other words, for every young person that scores 100 for a characteristic there is an equal or a larger share of young people that score low on it, which washes peak values out. Another way to put this is that the standard deviation across the 18 characteristics scores appears to grow with age (figure 11; see appendix I for the scores by age) – older employees performing one of the four ecommerce-related functions as a are more similar in their strong characteristics. This may suggest that more mature employees in a given function have through the years honed a certain set of characteristics in their jobs, that then as a result stand out in the data.

The data also suggests that groups with more experienced professionals have a larger share of people that “identify and develop ecommerce solutions” than do groups with younger professionals – a possible indication that the characteristics required for identifying ecommerce solutions are learned over time, as a person learns about the challenges and pain points in the sector they are in and the economy that can be solved with digital technologies.

Figure 11 – Standard deviations in average characteristics scores, by age



Granted, the lack of “standout” characteristics among students may simply mean that this group would need to be disaggregated further – for example by fields of study. It could well be that business students focused on sales and business development would have similar characteristics scores as sales and business development professions, for example. However, it does seem that young professionals that are no longer students also as a group do not have standout characteristics. This supports the idea that characteristics are sharpened over time or that the people with similar characteristics are gradually over the years sorted similarly in functions – and hopefully more and more optimally to perform the functions they are most suitable for.

Another policy-relevant question is whether the data can provide generalizable insight for the preparedness of Nigerian economic sectors for the digital economy. After all, in many economies, certain sectors like financial or IT services are much more advanced in their digitization than sectors such as healthcare, construction, or government.

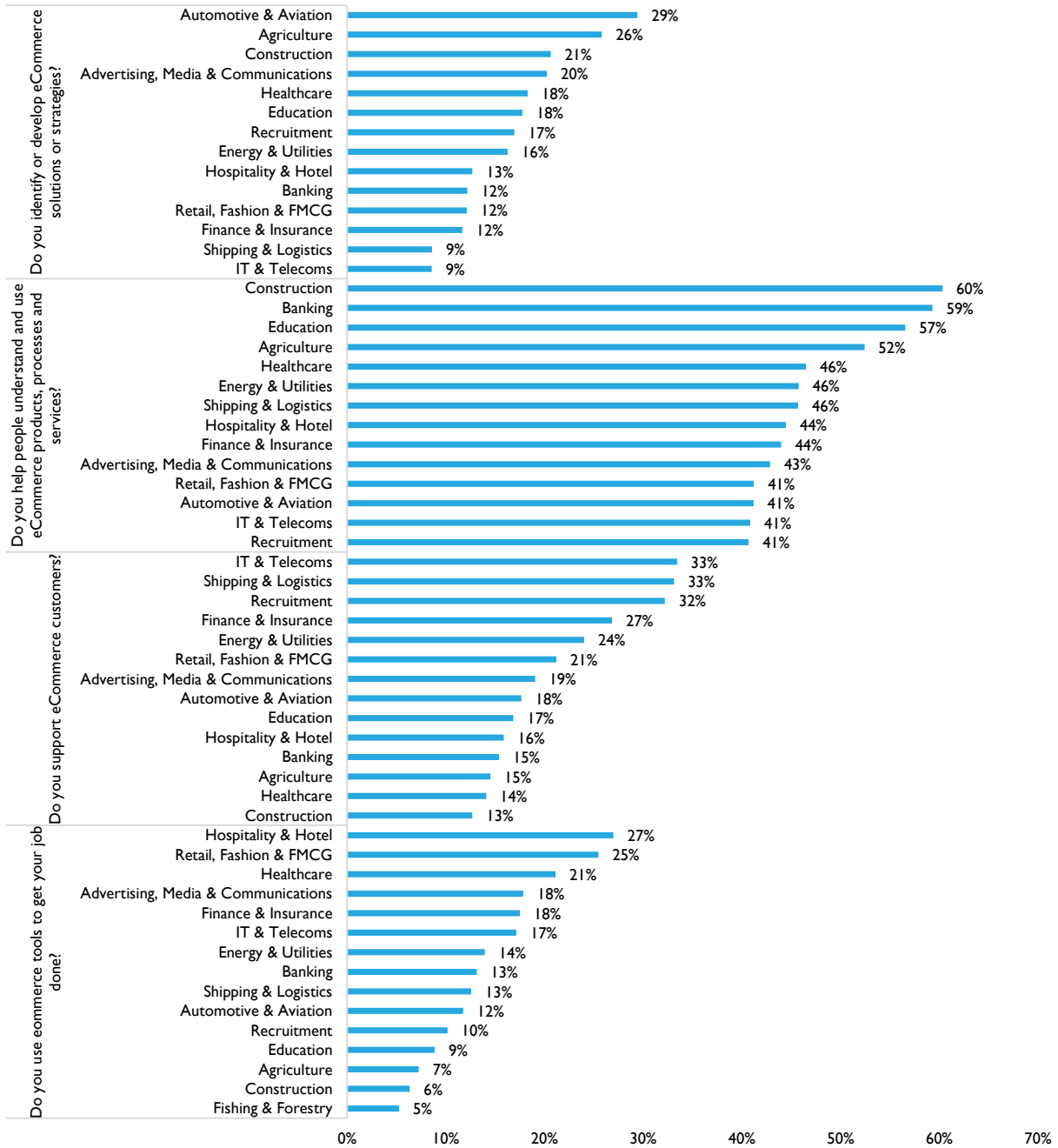
One interesting and policy-relevant sectoral hypothesis proposed by PeopleTree is that there would need to be some critical mass of all ecommerce-related groups within economic sectors and within firms to drive digital transformation. Empirically, the surveyed economic sectors with substantial samples vary quite widely by their use of employees with different ecommerce-related roles (figure 12). For example, automotive and aviation and construction sectors have in the dataset a substantive share of individuals (29 percent) that identify ecommerce strategies but relatively few individuals (18 percent) that identify as supporting ecommerce customers or using ecommerce tools to get their jobs done (12 percent); the IT and telecom and retail and consumer goods sectors are the opposite, as hypothesized.

The PeopleTree hypothesis could be tested with additional data that captures the success of Nigerian economic sectors in carrying out digital transformation processes, and exploring the association between the sector’s performance and its talent mix. Granted, this analysis may need to be sector-

specific: sectors are not necessarily directly comparable as they vary in their human resource needs. For example, a B2C retail and consumer goods company probably need a substantial body of persons to support ecommerce customers or use ecommerce platforms (developed by tech firms), while a B2B construction company would rather have a substantial set of individuals identifying digital applications conducive to efficient building processes. In other words, the optimal mix of talent (and characteristics) may necessarily vary across sectors.

The data here are by no means conclusive as the sectoral samples are small and not necessarily representative. Nonetheless the approach is useful and interesting to trace a sector's revealed needs for and uses of digital talent, and perhaps to highlight to executives in sectors that are lagging in digital transformation how their peers in other sectors have built their talent pools. For example, could the shipping and logistics sector that is in obvious need for digital solutions to streamline supply chains and reduce paper-based, manual processes involved with booking, operations, and billing benefit from hiring more workers able to identify digital solutions? Could the agricultural sector benefit from talent that uses ecommerce solutions? And so on.

Figure 12 – % of employees with ecommerce-related roles in different sectors



Alternative approach to derive ecommerce-related groups from the talent survey data

The analysis has so far leveraged only a tenth of the survey sample. To leverage the entire sample and understand whether and how the characteristics of the surveyed are associated with occupations and sectors, PeopleTree has proposed a way to aggregate the sample into four categories that capture a person’s engagement in the digital economy – namely by deriving the four groups from combinations of the 18 characteristics. PeopleTree has per prior engagements generated a composite indicator consisting of four characteristics that captures a respondent’s engagement in ecommerce (table 6). For example, individuals with a high average score of constant learner, big picture thinker, motivational cheerleader, and practical fixer would be “ecommerce champions” that identify opportunities and drive digital transformation processes. This method allows for using the entire sample of 27,216 individuals.

Here, we take this approach at face value as an alternative to the above analysis. Unlike in the above grouping, here the four groups overlap: an individual can have strengths in two or more areas, such as be a strong ecommerce champion and as ecommerce agent.

Table 6 – PeopleTree’s ecommerce-related groups and derived characteristics of individuals’ engagement in the ecommerce sector

Ecommerce type		Included characteristics
eCommerce Champion	Identifies opportunities and drives change, digitising products, processes and services.	04 - The constant learner 06 - The big picture thinker 12 - The motivational cheerleader 15 - The practical fixer
eCommerce Enabler	Onboards stakeholders into your digital eCommerce environment	02 - The flexible character 04 - The constant learner 12 - The motivational cheerleader 14 - The skilled communicator
eCommerce Agent	Supports and services within the eCommerce / digital environment	02 - The flexible character 04 - The constant learner 10 - The people manager 17 - The calming presence
eCommerce Citizen	Uses and understand the tools of the eCommerce ecosystem to drive efficiencies and grow business	01 - The energetic driver 04 - The constant learner 06 - The big picture thinker 11 - The social networker

There are some differences across occupations in the prevalence of ecommerce characteristics. Figure 7 explores the distribution of ecommerce talent across occupations. The most notable patterns is the even distribution of ecommerce characteristics among students.

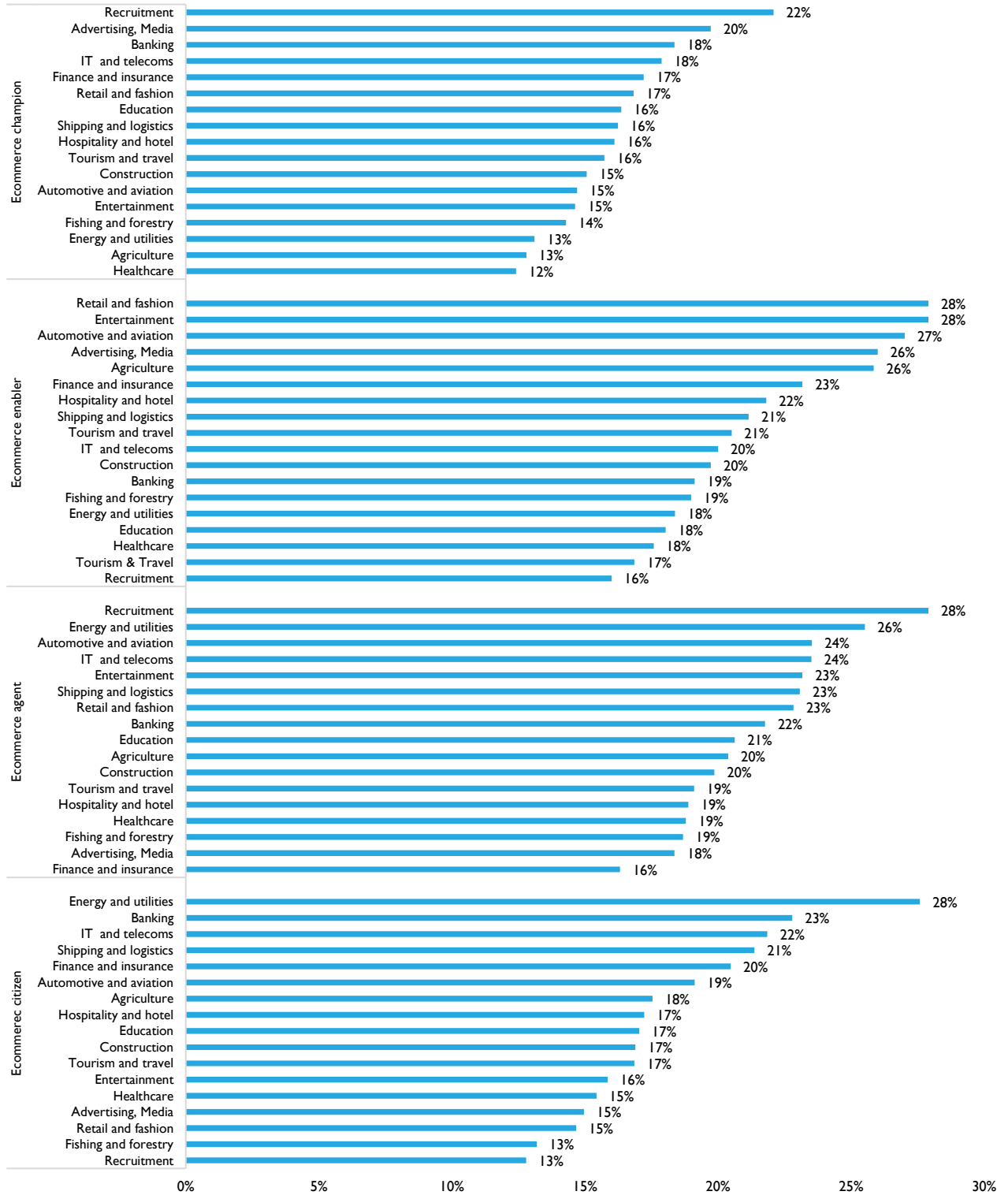
Table 7 – % of Respondents in PeopleTrees’ Ecommerce-Related Groups, by Occupations

	Technology leaders and CEOs	Technology - general	Management	Sales and business development	Finance
Ecommerce champion	16%	20%	21%	13%	21%
Ecommerce enabler	21%	18%	20%	24%	14%
Ecommerce agent	32%	21%	26%	28%	18%
Ecommerce citizen	22%	30%	21%	19%	18%

	Account manager	Administration	Accounting and auditing	Farming	Teacher	Student
Ecommerce champion	20%	12%	8%	13%	18%	16%
Ecommerce enabler	22%	18%	20%	29%	18%	17%
Ecommerce agent	30%	24%	26%	17%	22%	18%
Ecommerce citizen	20%	14%	17%	13%	27%	17%

Again it could be imagined that there would need to be a critical mass of all four types in firms and industries to drive digital transformation and thrive in the ecommerce era. The prevalence of individuals that score high (over 76) on each of these composite indices varies across economic sectors. For example, while industries such as recruitment, advertising and media, banking, and telecommunications have a sizable segment of individuals that are ecommerce champions, able to ideate and identify opportunities for digital transformation processes. Retail, entertainment, and aviation have a high share of individuals that help onboard ecommerce users, but fewer those that catalyze digital and ecommerce initiatives. with scored 100 on characteristics such as skilled communication, practical fixer, methodical organizer, and willing risk taker, while individuals who help people understand and use ecommerce scored 100 on characteristics like skilled communicator, imaginative mind, considerate carer, and practical fixer. Banking, IT and telecom, and energy and utilities have workers that use ecommerce and digital tools to drive new efficiencies.

Figure 5 – % of Ecommerce Characteristics by Sectors



To be sure, the sectoral variations again have to do with differences in the composition of samples within sectors – namely differences in the occupational profiles of persons surveyed in the various sectors. For example, as shown in the outset in figure 8, some 13 percent of the surveyed individuals in the IT and telecommunications sectors and 12 percent in the energy sector are sales and business development professionals – that tend also to be ecommerce enablers and agents. In addition, some sectors may inherently require more, say, finance or accounting staff – for example, 9 percent of individuals in the banking sector state as their occupation “finance” or “banking”. In turn, a strong share of people in these occupations are also ecommerce champions, which is reflected in figure 4. Similarly, 9 percent of the surveyed individuals in the retail sector are “designers”, of which nearly 30 percent are also strong ecommerce enablers.

In other words, correlations among occupations and characteristics are reflected in the digital skills and attributes in different sectors (where certain occupations are more prevalent than others). Future studies with a larger sample would need to control for general requirements for certain occupations in a sector, prior to determining whether a sector has “too many” or “too few” of individuals with a certain ecommerce-related characteristic. One useful way to do this assessment might be to look at job postings per sector and learn about the distribution of skills and aptitudes demanded by sector. Another might be to look at the distribution of talent in sectors that have accomplished digital transformation – to the extent that this is applicable to other sectors.

These data aggregations can be explored on PeopleTree website at **xxx**.

IV. CONCLUSIONS AND NEXT STEPS

This report has sought to connect the research and studies on platforms and initiatives to enable women-led ecommerce firms in order to discuss how development organizations, governments, and corporations could **work with platforms** to benefit women-led firms seeking to grow through ecommerce.

The purpose of this analysis has been to review new data emerging from a cognitive ability and skills assessment pilot of over 27,216 Nigerian students and employees performed by the Jobberman employment portal hosted by Ringier One Africa Media (ROAM). The data are a pioneering attempt to go beyond standard ways, such as years of schooling, of measuring workforce development and capabilities to capture the softer skills, attitudes and behaviors associated with excelling in digital business. The data as explored here are useful for different audiences.

- The data are perhaps especially useful for business leaders to assess the human capital in their organizations and improve matches between talent and occupations – for example, to enable young professionals with characteristics associated with “ecommerce champions” to drive ecommerce strategies. More generally, executives can use assessments as presented here to match employees or job candidates to the digital economy jobs they are most suited for. In addition, as every person evolves in his or her work, firms can find it useful to keep taking stock of their employee pool and matches of employees to functions on a continual basis.
- The data can also be useful for young professionals and students choosing career paths – to understand their own characteristics and how those characteristics are associated with certain functions in organizations in the digital era.
- Cognitive assessments as presented here can also be policy-relevant – to help identify the potential role of an organization or a sector’s prominent characteristics or a mix of characteristics in shaping digital transformation processes. The data indicate that in such large sectors as healthcare, energy, and agriculture, there are still few people that would champion digital transformation. A useful pilot would be to compare the characteristics of the employee pool in two companies, one that has succeeded at digital transformation and other that has not, in the same sector, and explore associations between employees’ skills and aptitudes in these two firms to the differences between their performance. A similar analysis could be done in two large sectors that difference in digitization – to what extent do the sectors differ in their digital transformation *because* of differences in the types and mixes of workers they have attracted and employed?
- With a larger sample than explored here, the data can also be useful for policymakers to track emerging supply of talent in labor markets in real-time. These data can also provide insights for assessing the readiness of youth for employment in the digital economy.

Granted, there are limitations to the data and methodologies of collecting it. Candidates self-selected into taking the survey, which means that the dataset is not necessarily generalizable – it may be composed more heavily than the general population of people with certain attributes, such as high

curiosity, digital aptitude, tenacity to complete the assignment, and professional ambition. It also may not be generalizable in terms of the range of occupations represented, or distribution of talent within sectors.

Taking the same snapshot across all Nigerians would probably yield somewhat different results, and provide more comprehensive insight on questions such as, do sectors with similar occupational profiles vary significantly in the distribution of ecommerce-related characteristics – and if so, in which sector are employees matched to their jobs best? Another interesting questions would be on whether small and larger firms with same occupational profiles and sectors match employees better to jobs than do large firms – for example if in small firms executives are more in tune with the capabilities needed in their organizations and better at matching talent to jobs.

Another limitation to the method here is that the data are static: it provides a snapshot of the skills and aptitudes of individuals in the various ecommerce-related job categories and in the broader economy. We however do not know whether the employees that took the survey are “perfect matches” for their occupations, ecommerce roles, and sectors or whether they are mismatched for the jobs they do. One extension to address this issue is their peers’ assessment of their performance, something the PeopleTree’s tool does enable. The data do suggest that the matching of people to occupations may improve with experience.

These data of course do not help understand how well the talent supplied in the labor market matches *future demand*. There is data on the types of characteristics that are currently in demand, based on an analysis of data on job postings. Jobberman’s database, which is the most comprehensive of job postings in Nigeria, indicates that in the first half of 2021, the greatest demand is for sales, marketing and communications accounting and auditing professionals.³⁰ However, while job posting data can account for shifts in the demand for occupations profiles in labor markets, they do not readily capture the skills, behaviors or aptitudes that are needed for persons in different occupations to excel in certain functions. More work would have to be carried out to match the data on the supply side of labor markets to the skills and attributes demanded in these occupations.

In addition, understanding how well workers can “leap” to new roles and settings is important: the Nigeria economy will evolve with technology and business models, and workers need to continually adjust. What is likely true is that workers that are able to adjust, learn, and interact with others – perhaps precisely the “constant learners” that many Nigerians are – will likely be in great demand in labor markets.

Appendix I – Characteristics by dimensions in the sample

Table I - I - PeopleTree characteristics by educational attainment

	High School	Diploma	HND	Degree	MBA / MSc.
Constant learner	83	70	80	80	76
Practical fixer	78	53	63	63	59
Considerate carer	73	70	65	67	69
Flexible character	72	81	66	73	70
Calming presence	72	78	61	66	61
Inspirational motivator	71	58	61	59	68
Responsible citizen	67	75	72	73	66
Energetic driver	67	75	66	64	64
Imaginative mind	65	64	68	65	62
Sound decision maker	62	61	62	59	68
Big picture thinker	62	61	58	63	61
Skilled communicator	60	61	60	65	63
Methodical organizer	60	58	58	62	55
People manager	56	64	62	63	70
Willing risk taker	56	75	53	64	57
Social networker	52	83	57	58	57
Conflict confronter	49	50	51	53	48
Effective negotiator	49	64	60	62	61

Table I - 2 - PeopleTree characteristics, by sector

	Big picture thinker	Calming presence	Conflict confronter	Considerate carer	Constant learner	Effective negotiator	Energetic driver	Flexible character	Imaginative mind
Advertising and Media	68.1	64.6	60.7	64.2	70.0	66.5	64.0	66.9	70.4
Agriculture	63.6	63.8	62.2	68.2	67.6	64.0	67.1	70.6	70.1
Automotive and Aviation	67.0	69.7	59.8	66.3	74.7	68.2	69.3	70.5	61.3
Banking	69.4	66.1	62.2	68.2	65.4	63.5	69.8	69.0	67.4
Construction	67.3	68.0	64.0	65.2	73.0	63.6	69.0	68.4	69.6
Education	64.6	65.6	63.9	66.0	71.1	64.3	70.7	70.6	65.7
Energy and Utilities	65.0	62.9	63.9	65.0	68.0	61.4	71.3	69.4	69.8
Entertainment	66.7	66.4	60.2	72.0	71.7	69.0	68.1	66.1	61.4
Finance and Insurance	67.8	64.7	60.8	66.1	72.2	64.0	70.2	70.2	68.6
Fishing and Forestry	64.3	65.0	64.3	71.7	72.7	65.3	64.7	64.7	71.3
Healthcare	68.5	67.9	63.2	65.6	68.5	63.0	66.8	73.1	66.6
Hospitality and Hotel	69.1	67.2	61.7	62.7	69.8	63.9	65.2	70.3	68.1
IT and Telecoms	68.6	65.5	58.7	68.2	74.3	64.4	69.5	72.1	67.5
Mining, Energy and Metals	66.7	69.2	66.2	63.7	67.2	59.2	74.6	72.6	70.6
Recruitment	73.3	70.2	66.0	64.9	68.0	62.8	57.2	69.8	69.8
Retail, Fashion and FMCG	66.7	67.6	59.5	67.8	72.1	63.9	65.6	71.2	67.9
Shipping and Logistics	66.9	64.8	58.3	62.0	74.7	63.5	71.4	67.7	64.8
Tourism and Travel	66.7	65.0	67.0	64.1	72.9	68.3	67.0	65.7	71.9

	Inspirational motivator	Methodical organizer	People manager	Practical fixer	Responsible citizen	Skilled communicator	Social networker	Sound decision maker	Willing risk taker
Advertising and Media	66.5	63.4	65.2	63.8	71.8	70.6	65.4	67.5	64.2
Agriculture	68.2	65.4	67.1	66.3	68.9	72.6	62.5	69.6	62.3
Automotive and Aviation	65.5	66.3	66.3	66.7	74.3	69.7	55.6	69.7	59.0
Banking	65.5	67.2	63.9	66.1	68.2	66.5	64.8	67.3	59.6
Construction	65.1	65.5	63.1	66.0	69.6	66.8	63.3	70.1	62.3
Education	66.3	65.0	66.7	65.5	67.9	67.9	65.4	68.9	64.0
Energy and Utilities	64.2	61.6	66.9	65.0	65.4	70.0	65.2	69.8	66.2
Entertainment	68.4	64.6	61.7	61.7	74.0	73.2	62.8	68.1	64.0
Finance and Insurance	64.2	64.3	65.2	64.9	68.2	71.7	63.4	68.1	65.5
Fishing and Forestry	67.0	67.3	66.7	62.3	69.0	67.3	64.0	67.0	65.3
Healthcare	61.6	63.3	66.7	68.4	70.8	70.8	61.1	67.7	66.1
Hospitality and Hotel	64.9	62.6	64.2	66.8	72.2	71.6	63.7	66.8	69.1
IT and Telecoms	64.4	63.4	64.1	68.1	71.7	68.3	63.6	66.8	60.8
Mining, Energy and Metals	56.7	62.7	63.7	66.7	71.1	71.6	63.2	73.6	60.7
Recruitment	65.3	63.5	64.9	66.0	68.1	71.6	55.1	69.5	66.0
Retail, Fashion and FMCG	64.5	64.4	66.3	65.7	72.2	68.7	63.9	67.0	64.9
Shipping and Logistics	63.8	70.6	65.4	67.7	69.3	66.4	67.7	68.8	66.1
Tourism and Travel	67.0	64.7	69.0	66.7	67.0	65.0	62.1	70.3	59.8

Table I -3 - PeopleTree characteristics, by age

	Under 25 years				25-30 years				
	None of the above	Identify or develop eCommerce solutions	Help people understand and use eCommerce products	Use eCommerce tools	None of the above	Identify or develop eCommerce solutions	Help people understand and use eCommerce products	Support eCommerce customers	Use eCommerce tools
Big picture thinker	60	65	63	64	64	63	66	66	72
Calming presence	67	63	65	64	65	60	64	65	63
Conflict confronter	63	66	66	64	63	65	62	58	58
Considerate carer	66	70	66	65	65	71	63	68	65
Constant learner	71	67	69	73	72	71	73	74	75
Effective negotiator	65	60	63	58	64	62	65	64	65
Energetic driver	67	72	71	75	67	68	70	70	66
Flexible character	69	70	70	70	70	66	70	70	72
Imaginative mind	60	72	65	60	68	73	69	70	72
Inspirational motivator	66	65	66	63	66	63	67	67	59
Methodical organizer	67	72	66	71	65	73	67	64	61
People manager	65	68	65	64	66	69	67	66	64
Practical fixer	66	68	69	71	65	72	68	66	64
Responsible citizen	60	66	66	70	70	66	66	72	71
Skilled communicator	67	66	68	71	68	64	65	66	69
Social networker	64	63	66	62	63	63	67	66	70
Sound decision maker	60	66	64	60	68	67	64	63	67
Willing risk taker	64	60	66	65	64	62	66	63	65

	31-35 years				Over 35 years				
	None of the above	Identify or develop eCommerce solutions	Help people understand and use e-commerce products	Support e-commerce customers	Use e-commerce tools	None of the above	Identify or develop eCommerce solutions	Help people understand and use e-commerce products	Support e-commerce customers
Big picture thinker	69	61	61	66	68	61	61	66	68
Calming presence	66	64	61	65	64	64	61	65	64
Conflict confronter	62	72	67	63	62	72	67	63	59
Considerate carer	65	69	63	74	65	69	63	74	68
Constant learner	72	72	72	71	72	72	72	71	74
Effective negotiator	64	61	61	67	64	61	61	67	64
Energetic driver	64	62	71	61	64	62	71	61	74
Flexible character	69	65	66	61	69	65	66	61	68
Imaginative mind	67	72	70	65	67	72	70	69	68
Inspirational motivator	67	63	71	73	67	63	71	73	70
Methodical organizer	65	72	61	67	65	72	61	67	57
People manager	66	70	68	67	66	70	68	67	62
Practical fixer	65	77	73	64	65	77	73	64	69
Responsible citizen	71	62	65	65	71	62	65	65	74
Skilled communicator	70	66	66	65	70	66	66	65	67
Social networker	63	63	66	63	63	63	66	63	64
Sound decision maker	71	67	68	64	71	67	68	64	65
Willing risk taker	64	61	68	64	64	61	68	64	64

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² Daruich, Diego, "The Macroeconomic Consequences of Early Childhood Development Policies," Federal Reserve Bank of St. Louis Working Paper 2018-29, 2018; Hanushek, Eric and Ludger Woessmann, "The Role of Cognitive Skills in Economic Development," *Journal of Economic Literature*, September 2008, 46 (3), 607-668. Heckman, James J. and Tim Kautz, "Hard evidence on soft skills," *Labour Economics*, 2012, 19 (4), 451-464.

³ There are many types of skills and aptitudes. Per a World Bank definition, "Cognitive skills include literacy and numeracy. They refer to the ability to understand complex ideas, adapt effectively to the environment, learn from experience, and reason. Socio-emotional skills refer to the ability to navigate interpersonal and social situations effectively and include leadership, teamwork, self-control, and grit. Technical skills refer to the acquired knowledge, expertise and interactions needed to perform a specific job, including the mastery of the materials, tools, or technologies." See <https://www.worldbank.org/en/topic/skillsdevelopment>

⁴ There are some studies that seek to bridge these data gaps by leveraging data from online talent platforms such as LinkedIn and classifieds. There are a number of studies and initiatives leveraging LinkedIn data for economic and policy research; see <https://blogs.lse.ac.uk/impactofsocialsciences/2019/07/09/using-linkedin-for-social-research/>. Amaral et al (2018) usefully operationalize LinkedIn data to understand changes in occupational profiles in Latin America and workers' potential to leap into a growing job category. See Nicole Amaral, Nick Eng, Carlos Ospino, Carmen Pagés, Graciana Rucci, and Nate Williams, "How Far Can Your Skills Take You?" Inter-American Development Bank, August 2018, <https://publications.iadb.org/bitstream/handle/11319/9089/Technical-Note-How-Far-Can-Your-Skills-Take-You.pdf?sequence=1&isAllowed=y>. Our work is very much in this vein, building on this promising stream of literature. builds upon several recent studies that

More generakly, this paper builds on the many recent studies that assess the skills requirements of different tasks and occupations (Autor, Katz, and Kearney 2006; Autor 2013; Autor and Handel 2013; Acemoglu and Autor 2012; Acemoglu and Restrepo 2018a, 2018c, 2018b).

⁵ See excellent reviews <https://publications.iadb.org/publications/english/document/Learning-Better-Public-Policy-for-Skills-Development.pdf>. See asp survey https://www.manpowergroup.com/wps/wcm/connect/0b882c15-38bf-41f3-8882-44c33d0e2952/2014_Talent_Shortage_WP_US2.pdf?MOD=AJPERES&ContentCache=NONE

⁶ <https://www.weforum.org/reports/the-future-of-jobs-and-skills-in-africa-preparing-the-region-for-the-fourth-industrial-revolution>

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⁹ <http://uis.unesco.org/sites/default/files/documents/new-methodology-shows-258-million-children-adolescents-and-youth-are-out-school.pdf>

¹⁰ In Ethiopia, for example, the share of employment in high-skill occupations increased by 13 percentage points from 2000 to 2014. <https://www.worldbank.org/en/publication/wdr2019>

¹¹ WB

¹² WB

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https://www.afdb.org/sites/default/files/documents/publications/wps_no_326_youth_jobs_skill_and_educational_mismatches_in_africa_fl.pdf

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- ¹⁴ See on informality and low productivity <https://oecd-development-matters.org/2017/10/03/services-informality-and-productivity-in-africa/>
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- ¹⁷ Dirk Krueger and Krishna B. Kumar, “Skill-Specific Rather Than [sic] General Education: A Reason for US-Europe Growth Differences?” NBER Working Paper No. 9408, January 2003, <http://www.nber.org/papers/w9408>.
- ¹⁸ Maja Jandrić, Saša Randelović • Adaptability of the workforce in Europe – changing skills...
Zb. rad. Ekon. fak. Rij. • 2018 • vol. 36 • no. 2 • 757-776
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- ²² <https://www.sciencedirect.com/science/article/pii/S0306919216303803>
- ²³ For a good discussion, see https://repositorio.cepal.org/bitstream/handle/11362/44605/1/S1900308_en.pdf. In Mexico, human resources firms have collaborated with the IDB to set up TallentiaMX as a collaboration platform that promotes talent and strengthening of human capital, and helps companies identify subcontracting opportunities.
- ²⁴ For a good discussion, see https://repositorio.cepal.org/bitstream/handle/11362/44605/1/S1900308_en.pdf. In Mexico, human resources firms have collaborated with the IDB to set up TallentiaMX as a collaboration platform that promotes talent and strengthening of human capital, and helps companies identify subcontracting opportunities.
- ²⁵ For research on skills content of jobs, see Autor, Katz, and Kearney 2006; Autor 2013; Autor and Handel 2013; Acemoglu and Autor 2012; Acemoglu and Restrepo 2018a, 2018c, 2018b.
- ²⁶ For research leveraging LinkedIn data, see <https://blogs.lse.ac.uk/impactofsocialsciences/2019/07/09/using-linkedin-for-social-research>. LinkedIn itself provides useful data in <https://graph.linkedin.com/insights/labor-market>
- ²⁷ See Nicole Amaral, Nick Eng, Carlos Ospino, Carmen Pagés, Graciana Rucci, and Nate Williams, “How Far Can Your Skills Take You?” Inter-American Development Bank, August 2018, <https://publications.iadb.org/bitstream/handle/11319/9089/Tech-nical-Note-How-Far-Can-Your-Skills-Take-You.pdf?sequence=1&isAllowed=y>.
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