



FUTURA

Diagnostics on the **technology divide** on Aruba

May 16th, 2022

Acknowledgements

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This report was prepared by Cornerstone Economics – Rendell de Kort and Lay Hing de Kort-Yee, with the assistance of the Cornerstone Economics survey team.



Contact

Queries and comments can be addressed to Rendell E. de Kort, partner, Cornerstone Economics.

E-mail: rendell@c-economics.com

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Acronyms

BES	Bonaire, Sint Eustatius and Saba
CAS	Curacao, Aruba and Sint Maarten
CBS	Central Bureau of Statistics Aruba
CENSO	Civil Registry and Population Register
DSL	Digital Subscriber Line
GDP	Gross Domestic Product
ICT	Information and communication technologies
OECD	Organization for Economic Co-operation and Development
NDA	National Digital Agenda
SIDS	Small Island Developing States
SVB	Social Insurance Bank
WEB	Water and Electricity Company Aruba

Summary

To articulate Aruba's national vision for digitally inclusive growth, Stichting Futura requested Cornerstone Economics in the formulation of a strategic primer for the National Digital Agenda (NDA). As a point of reference, the OECD going digital toolkit was utilized. The operationalization entailed the collection of secondary data and the collection and analysis of primary data through the execution of surveys amongst a representative sample of Aruba's population and businesses. The surveys form a baseline assessment for informed and evidence-based decision making relating to the possible gaps in technology and digital thinking in Aruba.

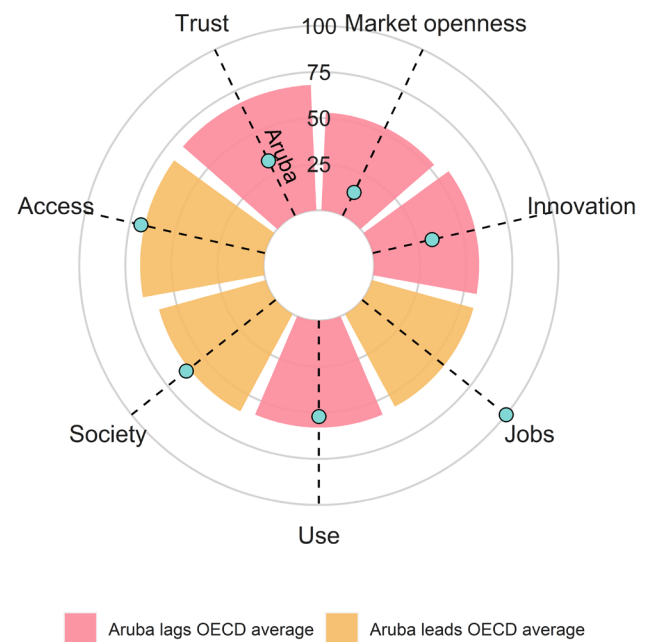
The OECD framework consists of seven policy dimensions that Aruba must focus on to become digital-ready, namely:

1. Access
2. Use
3. Innovation
4. Jobs
5. Society
6. Trust
7. Market openness

The results suggest that Aruba lags significantly in **4 of the 7 dimensions**, namely in innovation use, trust, and market openness. While for access and society Aruba hovers close to the global average.

On balance this results in a negative overall ranking compared to the countries included in the OECD digital divide database.

Figure A.1: Aggregate results Aruba vs. OECD average



Source: Cornerstone Economics (2022)

Access and Use are comparatively well in line with the global averages. This implies that the fundamental communication infrastructure that underpins the global transformation is well available to the general population. A large portion of the population can access the internet, is connected to social media and have the availability of enabling hardware. Contrary to many other countries, there is little evidence of a significant divide between rural and urban populations, suggestive of adequate social inclusion. Businesses are predominantly micro (78 percent) and by and large have a social media presence.

For Aruba, the more relevant question revolves around how technology is leveraged to empower businesses from merely a social media presence to digital exporters and Individuals from passive social media consumers to global value creators. The level of innovation and sophistication

appears low, with a low share of business start-ups and a worrisome low level of business making e-commerce sales across borders. The latter is apparent from the fact that even though Aruba has an open economy with high services exports and import of goods, 72% of firms do not sell across borders, with only a minimal share of businesses able to offer payment methods facilitating such transactions.

On the individuals end, 13.3% of the population do not have access to a credit card or other payment tools to complete online payments. Facilitating and encouraging the adaptation to digital commerce to boost market access to micro and small businesses could be a critical step to further bolster resilience.

Economic Snapshot of the Digital Divide

Relative to its peers in the Kingdom of the Netherlands, Aruba counts with the highest percentage of internet penetration relative to its population. This implies an even higher internet penetration than the Netherlands, which as a developed nation maintains higher GDP per capita levels compared to the Dutch Caribbean islands within the Kingdom of the Netherlands.

Figure A.2: Internet percentage population penetration

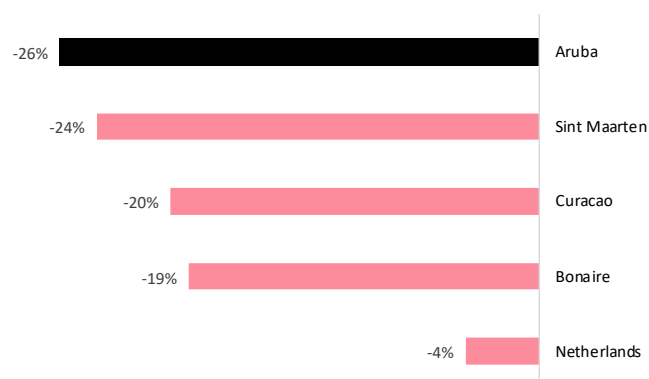


Source: *Internet World Stats* (retrieved 2022/03/21)

While the COVID-19 pandemic inflicted severe economic damage across the Kingdom of the Netherlands due to government enforced lockdowns to contain the virus, the economic impact was considerably more pronounced on the Dutch Caribbean islands, with Aruba facing the most severe contraction of all.

The main driver for the observed contractions on the Caribbean islands is related to the extent that these economies were dependent on the tourism industry as their main source of income. While the COVID-19 pandemic and the associated lockdowns inflicted severe disruptions in the labor market of all countries within the Kingdom of the Netherlands, the commerce and industry sector in theory holds greater potential to support jobs that can be carried out remotely. While these sectors are well developed in the Netherlands, the Dutch Caribbean islands in contrast, rely heavily on the tourism industry, with its services demanding physical presence. The COVID-19 pandemic has further changed the way we think about working from home. But the situation varies widely depending on the business activity conducted and the ability of the nation to remain agile and adapt to changing circumstances.

Figure A.3: Estimated real GDP contraction in 2020



Source: World Bank (2021)

Though data post-COVID is not abundantly available, in Bonaire, 31 percent of businesses whose principal activity was not related to tourism were able to have between 75 to 100 percent of its employees work at least in part remotely from home, compared to just 12 percent for businesses catering to the tourism industry.

The result is indicative for the feasibility of significant remote work being less apparent in tourism (service) dependent economies. In terms of recovery strategy, connection to internet was deemed critical infrastructure and policy makers acted swiftly by countering the negative effects inflicted by the shutdown by offering subsidies for internet connection.

It was further also concluded that the type of available jobs also matter: Educated people tend to have high-skilled jobs that are amenable to working from home (World Bank, 2022).

This further resulted in the World Bank concluding that in Bonaire, a critical look at the labor market should factor in the consideration of strengthening technical and digital skills through education and ultimately of structural economic transformation.

1) World Bank (2022). Post-Disaster Needs Assessment Bonaire. Socioeconomic assessment March-December 2022.

Profile

Demographics of respondents

Collected responses cover a representative sample of individuals living across the island.

To ensure representativeness, surveyors were instructed to collect responses from individuals at strategic locations selected across the island. Figure A.4 marks the street name where the respondent resides.

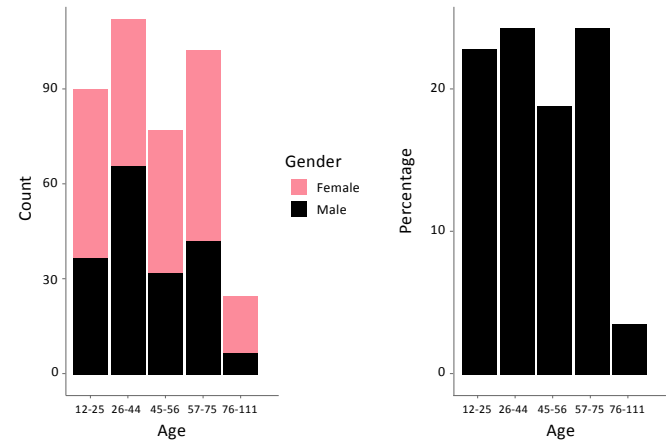
Figure A.4: Survey responses by address



Source: Cornerstone Economics (2022)

Individual survey responses display a comparable age composition as to that of the population of Aruba as registered by the Central Bureau of Statistics (Figure A.5). This mirroring was achieved through quota sampling. While a quota was not directly applied to gender, figure A.4 also suggests a good balance between female and male responses.

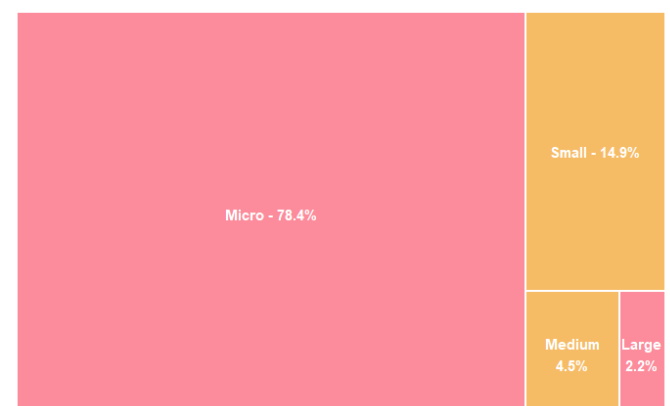
Figure A.5: Age and gender distribution individual survey response vs. age distribution of the population



Source: Cornerstone Economics (2022)

The survey among businesses in Aruba focused on insuring representativeness by size of company and captures the relatively large share (78.4%) of businesses pertaining to the size 'micro'. The classification was maintained methodologically consistent with the definitions applied by the European Union, meaning businesses were classified according to their number of employees.

Figure A.6: Business survey response distribution



Source: Cornerstone Economics (2022)

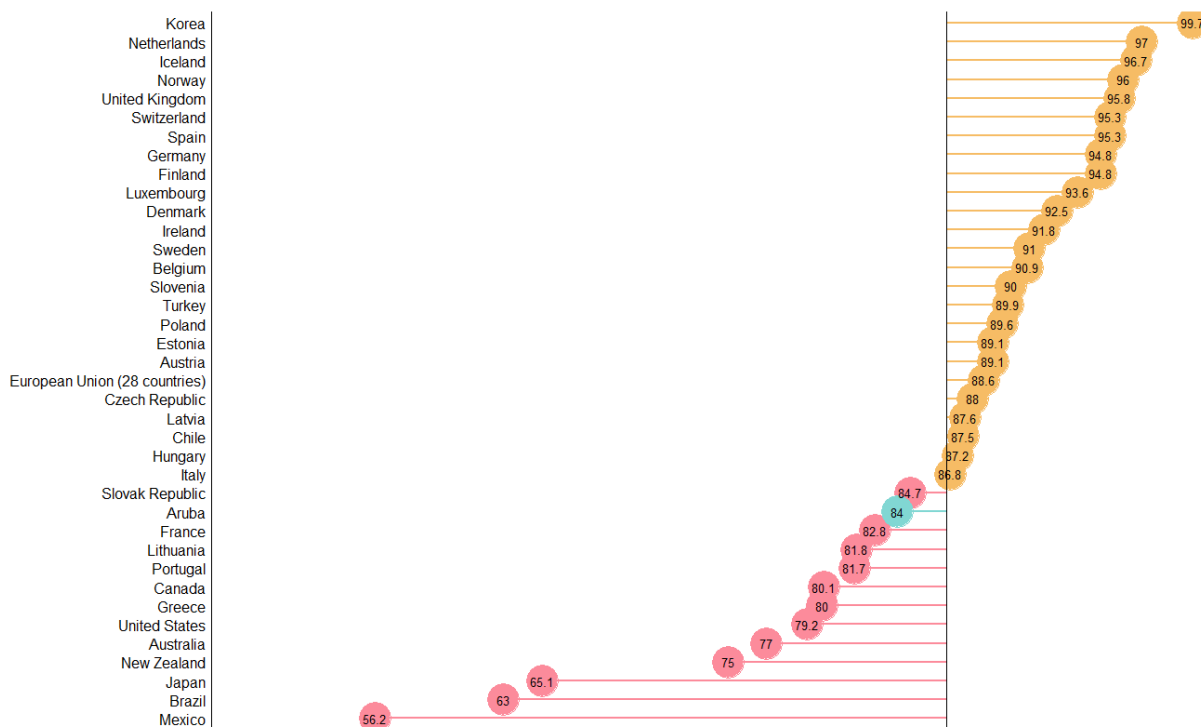
1. Access

Access to communications infrastructures, services and data underpin digital transformation and become more critical as more people and devices go online.

1.1 Household broadband access

In Aruba, 84% of households have purchased subscriptions to fixed broadband services. Broadband is fundamental for individuals to access the Internet and the global free flow of information. This indicator measures the uptake of broadband connectivity by households.

Figure 1.1: Share of households with broadband connections



Source: OECD, Cornerstone Economics

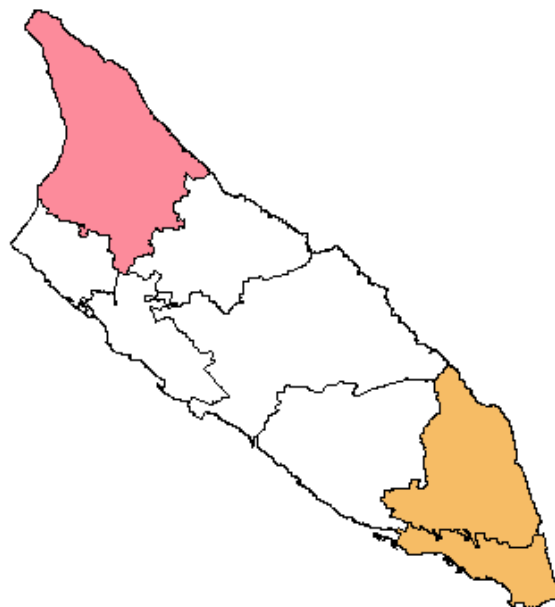
1.2 Disparity in broadband uptake between urban and rural households

Households in San Nicolas are 5.1% less likely to have access to broadband internet at home compared to households in Noord.

Ensuring adequate access to communications infrastructures in all geographic areas is essential to bridging connectivity divides that may arise due to country size, topology, and population density, among other factors. This indicator measures the disparity in broadband uptake between urban and rural households. It reflects the share of households that have purchased subscriptions to fixed line (DSL, cable, fiber, satellite, terrestrial fixed wireless, and it is calculated as the share of urban households with broadband Internet access minus the share for rural households.

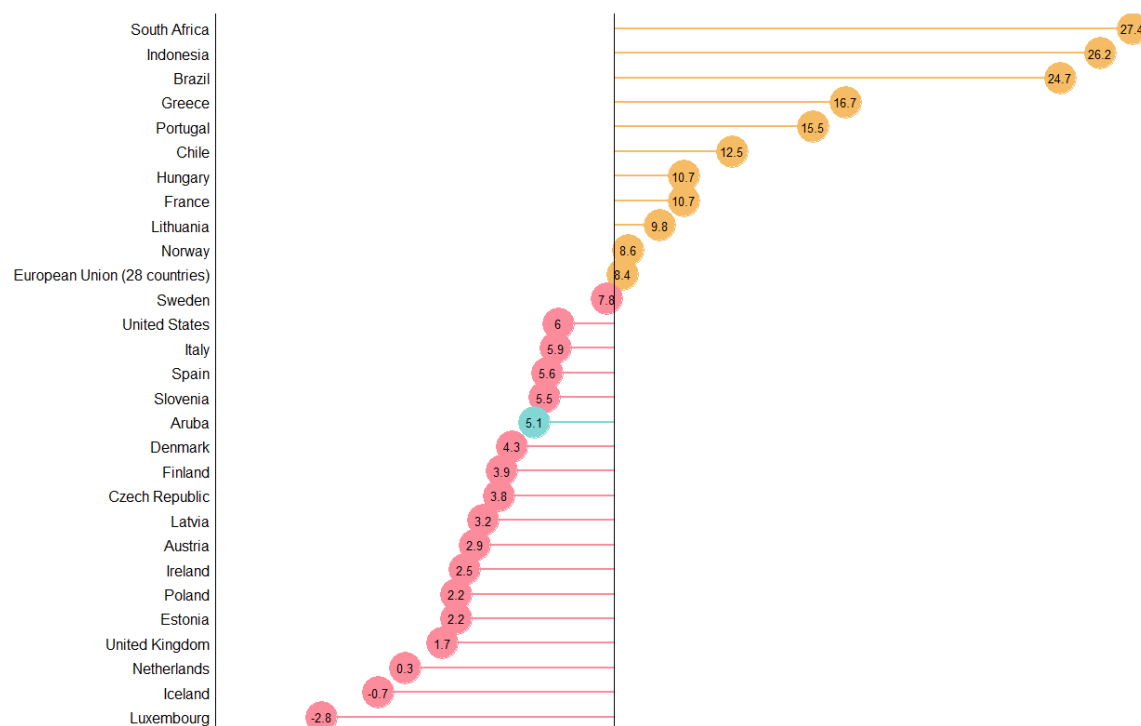
The results confirm that the affluence of the region correlates with a disparity in broadband uptake. Given Aruba's characteristics as a heavily urbanized SIDS with no discernable classification of urban versus rural, instead the disparity between broadband uptake between the wealthiest region of Noord (shaded in pink) and the most deprived region of San Nicolas Noord and San Nicolas South (shaded in orange) was utilized.

Figure 1.2.1: Disparity in broadband uptake between Noord and San Nicolas



Source: Cornerstone Economics (2022)

Relative to other countries, the disparity in broadband uptake in Aruba is below average. This suggests that the digital divide between households, at least in terms of geographical location, is limited.

Figure 1.2.2: Disparity in broadband uptake between urban and rural households

Source: OECD, Cornerstone Economics

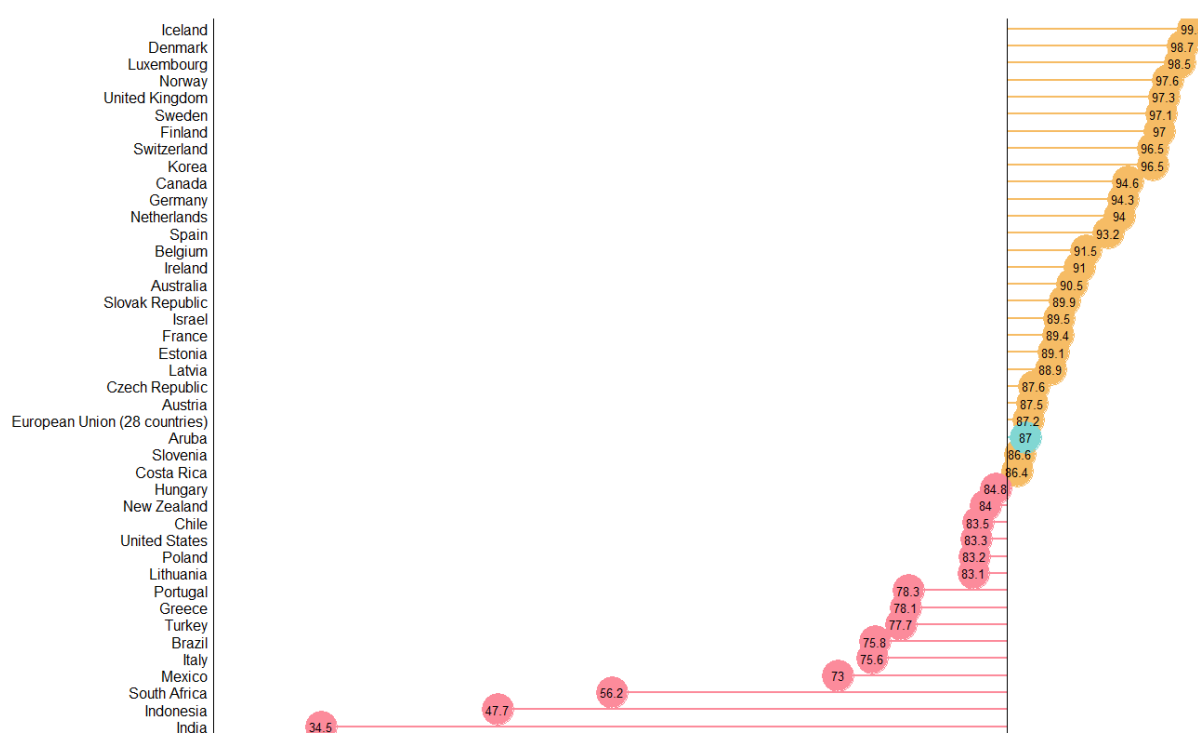
2. Use

The power and potential of digital technologies and data for people, firms and governments depends on their effective use.

2.1 Internet users as a share of individuals

87% of the Aruban adult population is an internet user. In most OECD countries it currently takes values between 80% and 100% and Aruba in this regard performs slightly above average.

Figure 2.1: Internet users as a share of individuals

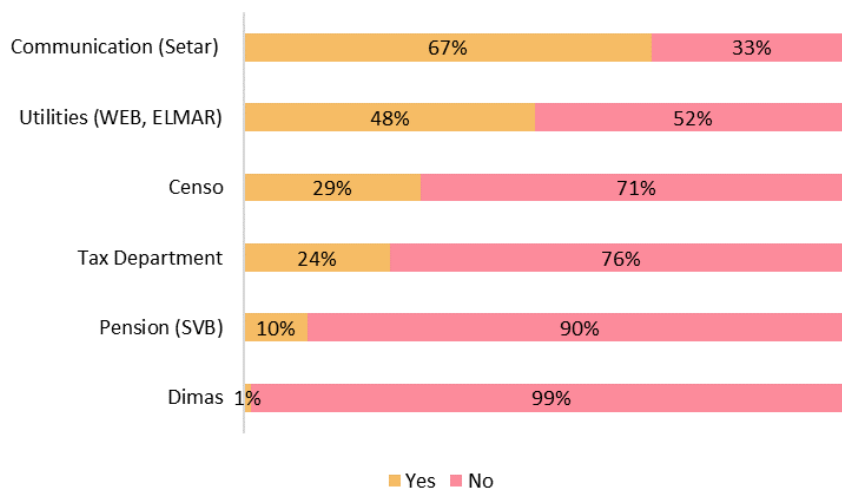


Source: OECD, Cornerstone Economics

2.2 Individuals using the internet to interact with public authorities

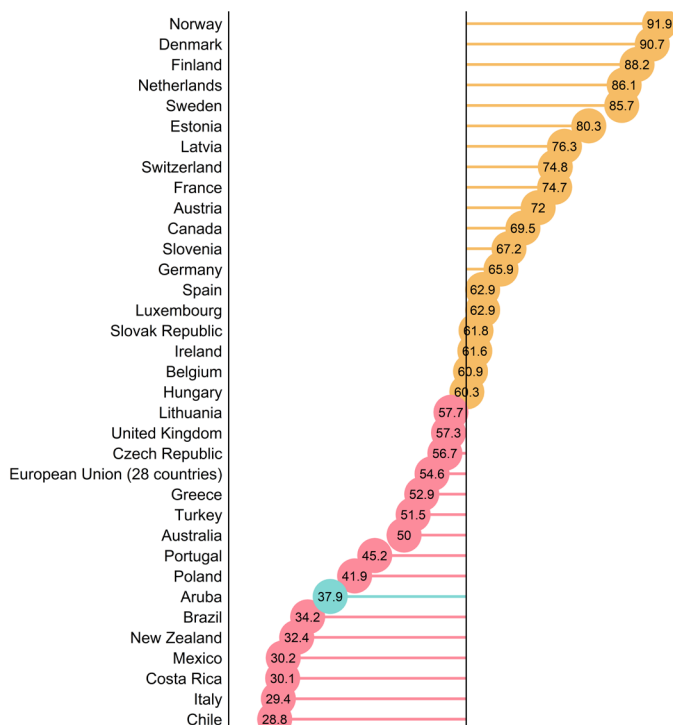
About 84% of all individuals aged 16-75 years use the internet to in some form interact with (quasi) public authorities. Interaction varies, and the uptake is the largest for telecommunication services, followed by the utility companies (WEB and ELMAR). These quasi-public authorities outperform the usage of core government services, such as those of the civil and population registry (CENSO) and the tax department. For comparison purposes, when narrowing the definition and excluding the quasi-government services, the uptake of digital government services is much lower, namely 37.9 percent.

Figure 2.2.1: Uptake of digital government services by individuals



Source: Cornerstone Economics (2022)

Figure 2.2.2: Share of individuals using the internet to interact with public authorities

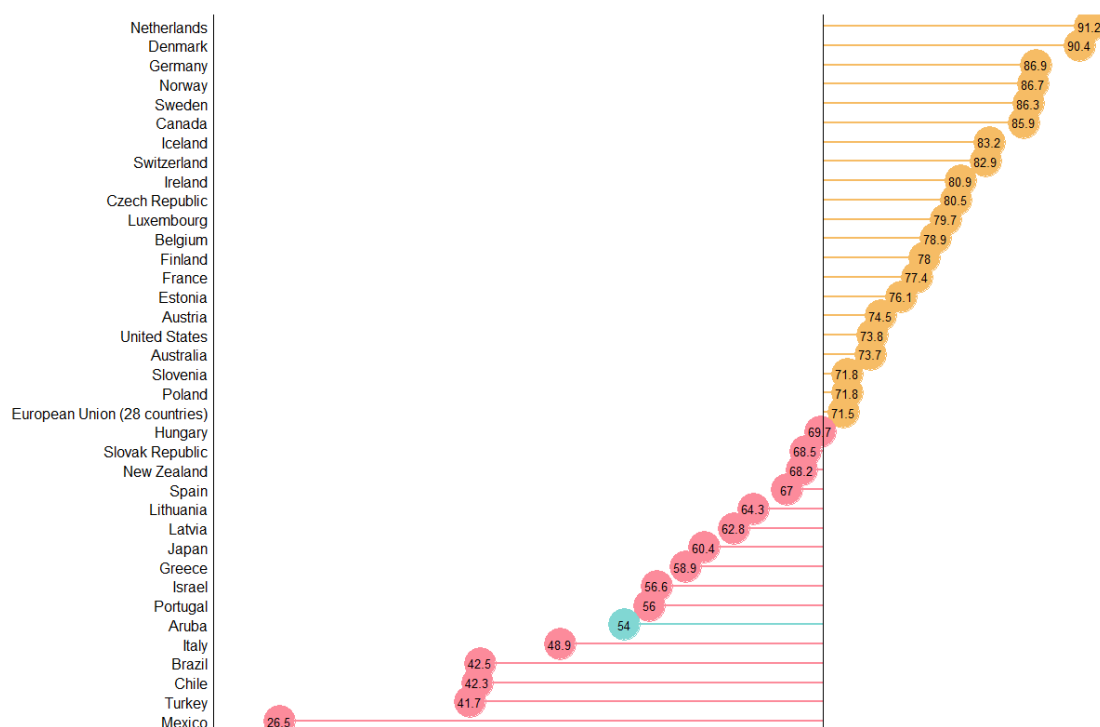


Source: OECD, Cornerstone Economics

2.3 People buying online

Of internet users, in Aruba only 54% have purchased online in the last 12 months while the global average is 70%. This indicator measures the prevalence of a relatively sophisticated internet activity, though its level can also reflect the maturity of Aruba's e-banking and e-payment systems, as well as cultural habits and preferences related to privacy, security and consumer protection for online transactions. An e-commerce purchase describes the purchase of goods or services conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders.

Figure 2.3: Share of Internet users who have purchased online in the last 12 months

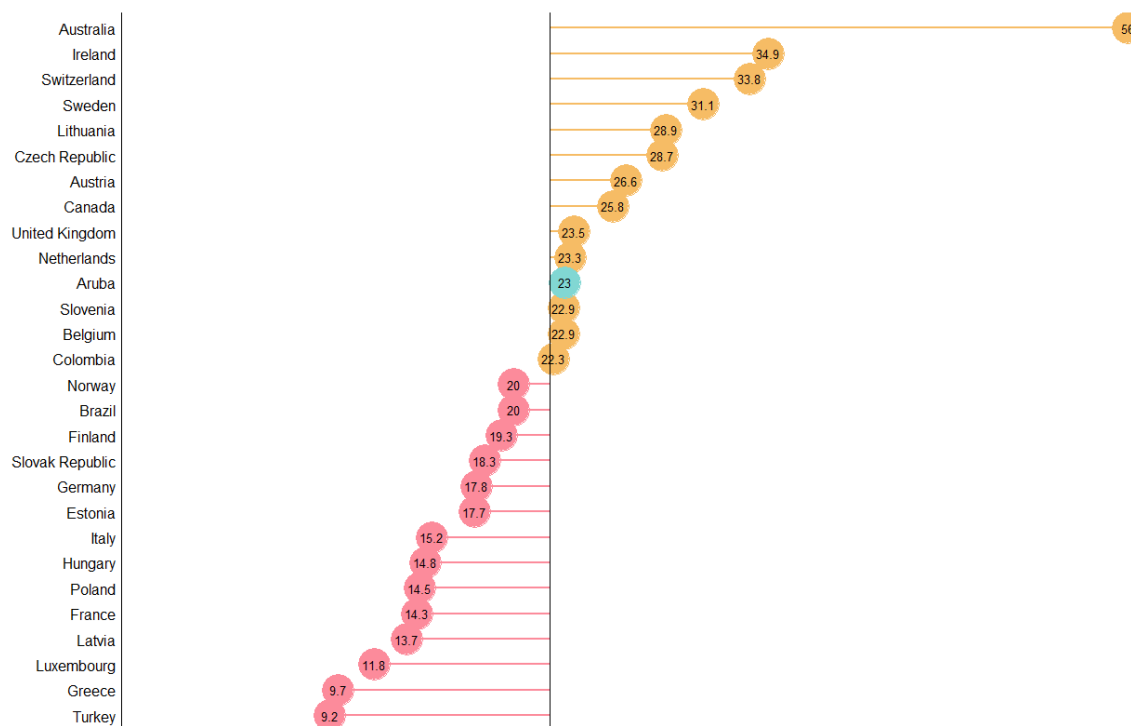


Source: OECD, Cornerstone Economics

2.4 Share of small businesses making e-commerce sales

Roughly about a quarter of small businesses in Aruba engaged on e-commerce sales in the last 12 months. This appears to be in line with the global average, though it must be noted that other countries may have made significant advances in this area following the COVID-19 crisis.

Figure 2.4: Share of small businesses making e-commerce sales in the last 12 months

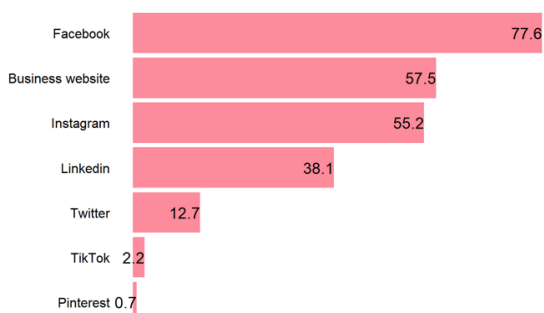


Source: OECD, Cornerstone Economics

2.5 Share of businesses with a web presence

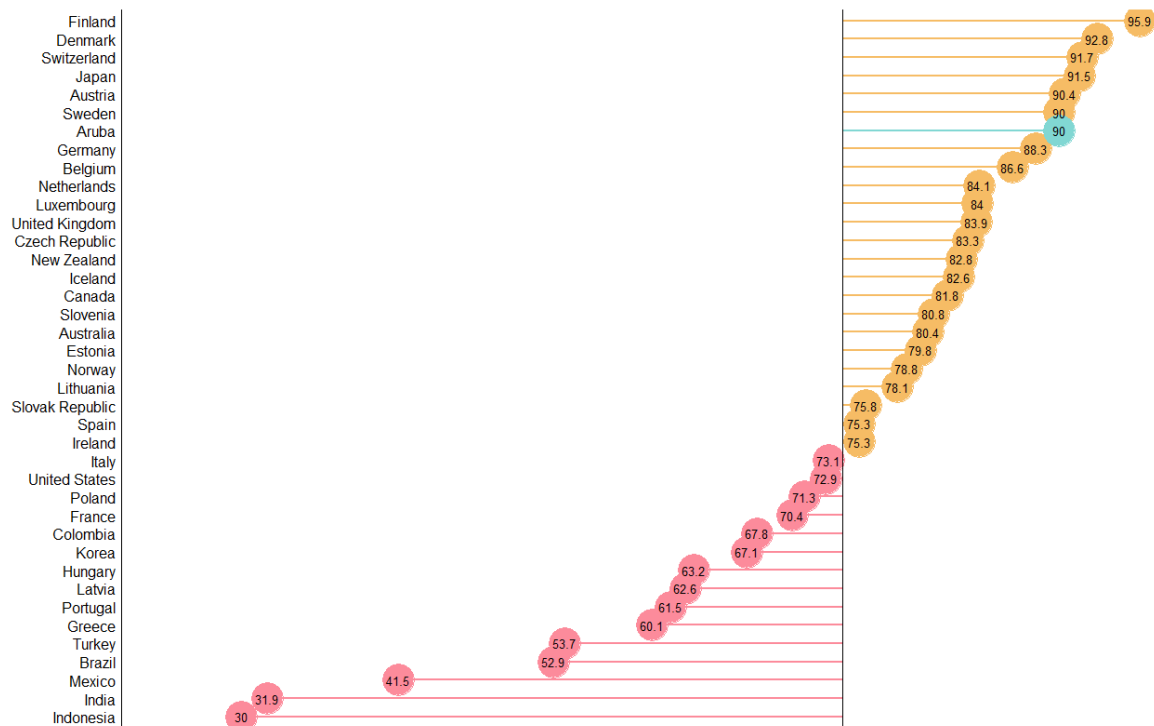
Consistent with the activity of individuals, businesses in Aruba predominantly maintain a web presence on Facebook (77.6%) and to a lesser extent maintain a website (57.5%) or an Instagram presence (55.2%). While most businesses choose a presence on a combination of social media platforms, twitter is only utilized by 12.7% of businesses.

Figure 2.5.1: Share of businesses in Aruba by type of web presence



Source: Cornerstone Economics (2022)

Figure 2.5.2: Share of businesses with a web presence



Source: OECD, Cornerstone Economics

3. Innovation

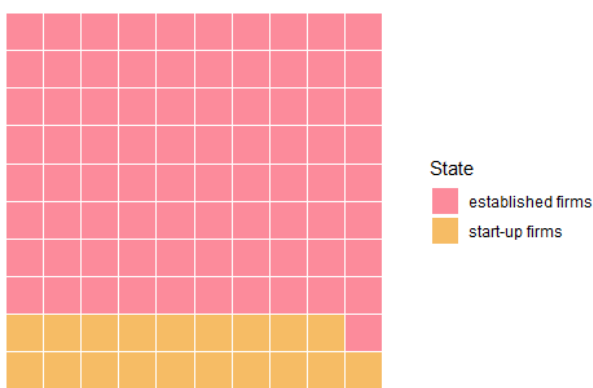
Innovation pushes out the frontier of what is possible in the digital age, driving job creation, productivity, and sustainable growth.

3.1 Share of start-up firms

In Aruba, 19 percent of firms are classified as 'start-ups'. Out of the business population, start-up firms were defined as those existing up to 2 years.

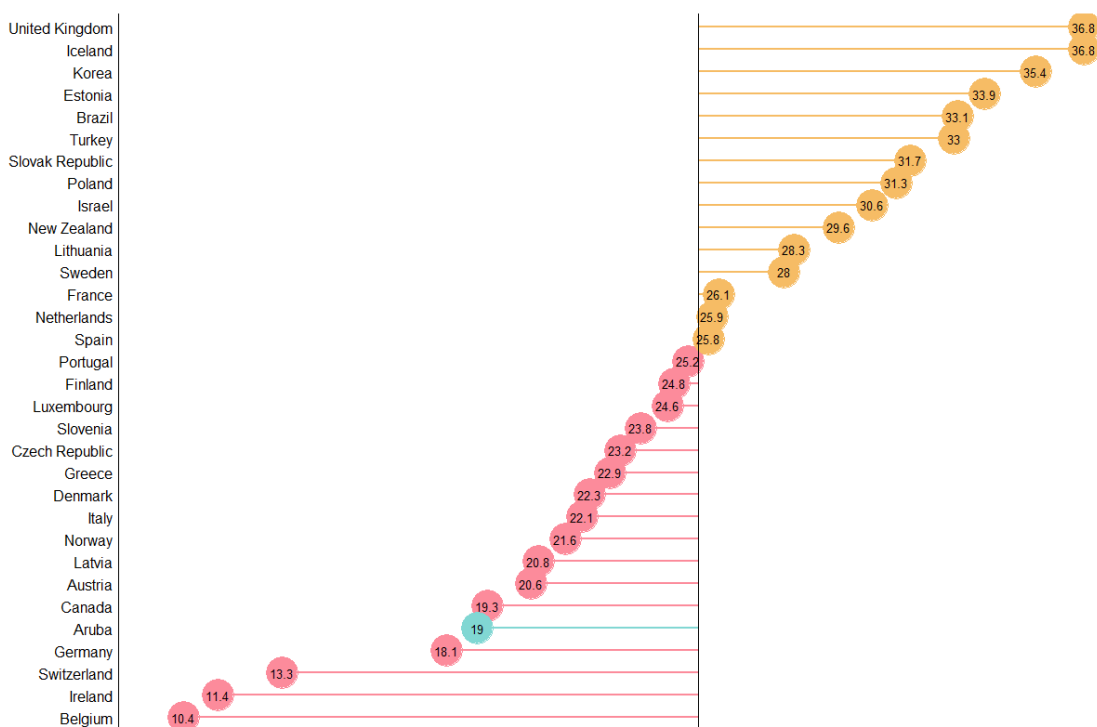
Figure 3.1.1: Share of start-up firms (up to 2 years old) in the business population

N=134



Source: Cornerstone Economics (2022)

Figure 3.1.2: Share of start-up firms (up to 2 years old) in the business population

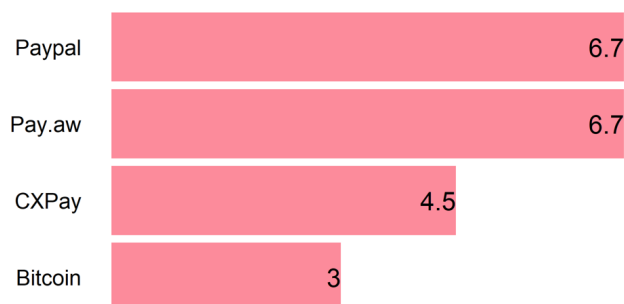


Source: OECD, Cornerstone Economics

3.2 Businesses accepting alternative means of payment

Of the businesses in Aruba, only a small minority adopt alternative payment methods. While financial technology has been growing rapidly, fintech provides opportunities to deepen financial development, competition, innovations, and inclusion but also creates new and only partially understood risks. Despite this not being included as an indicator for innovation in the OECD framework, it can be concluded that this type of innovation is only marginally adopted in Aruba.

Figure 3.2: Adoption of alternative means of payments by businesses on Aruba (in percent)

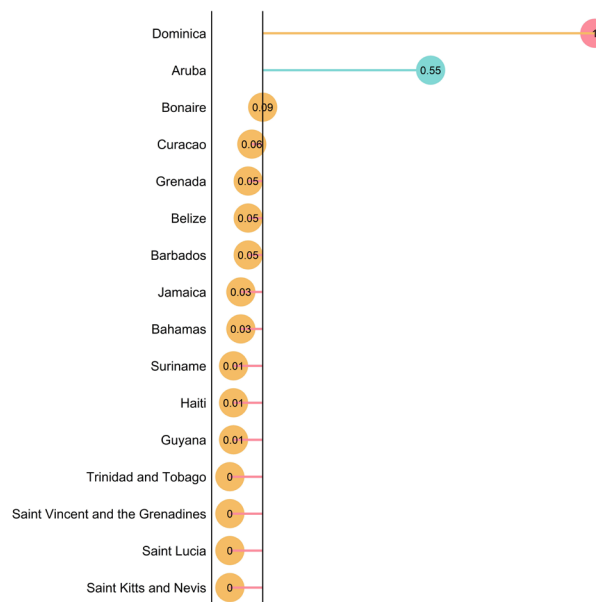


Source: Cornerstone Economics (2022)

3.3 Software developer activity

An alternative proxy for innovation is the number of software developers relative to the population in a given country, expressed as the number of users with Github profiles. However, such a proxy is not readily available for countries in the Caribbean, including for Aruba. Consequently, a custom query was created, pulling the data from the Github database.

Figure 3.3: Software developer activity in the Caribbean relative to population (normalize Github data)



Source: Cornerstone Economics (2022) retrieved from Github (2022)

4. Jobs

As labor markets evolve, we must ensure that digital transformation leads to more and better jobs and to facilitate just transitions from one job to the next.

4.1 Workers receiving employment-based training

Business report that employment-based training is offered to 79% of employees.

This is the highest share recorded in the country comparison. However, the results are speculative at best due to at least two potential shortcomings: Firstly, the OECD responses date from 2015, which means they are considerably older than the Aruba observations. Secondly, the Aruba sample may be biased due to self-reporting and sample selection.

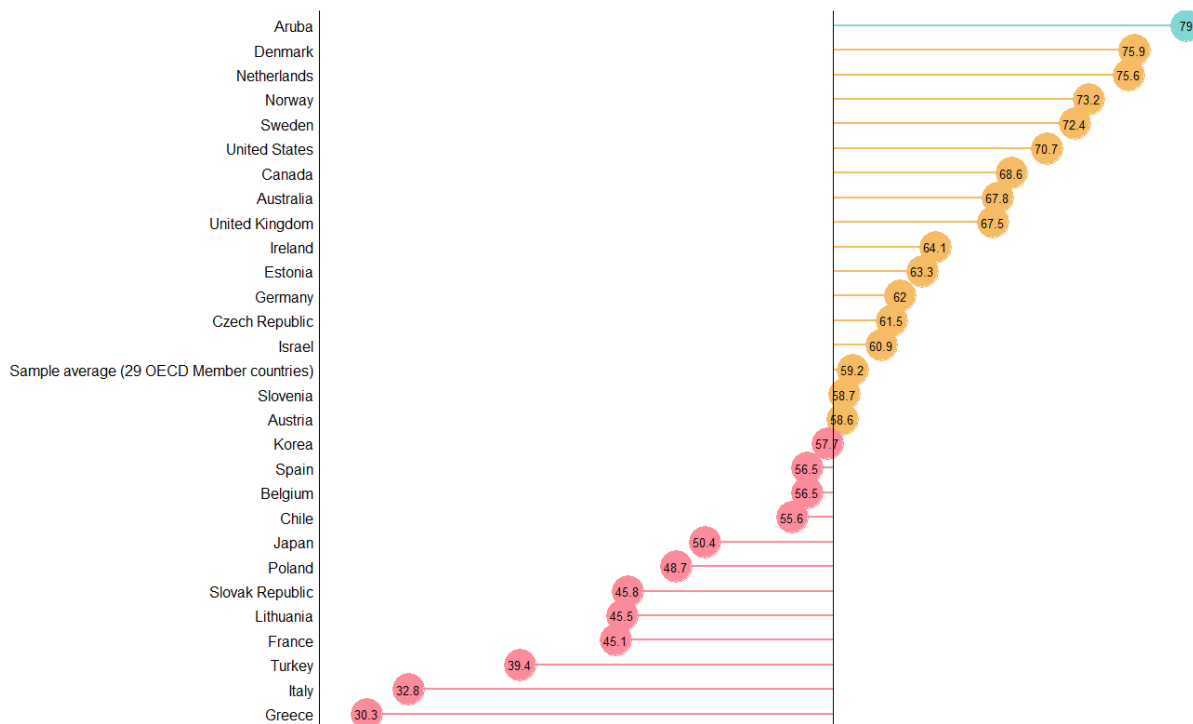
Zooming in to the results for Aruba by skill set, what is evident is that low skilled employees are significantly more likely to not receive employment-based training. Given the economic structure of Aruba, this consideration should factor into inclusive policy making.

Figure 4.1.1: Percentage share of workers receiving employment-based training, by skill



Source: OECD, Cornerstone Economics

Figure 4.1.2: Share of workers receiving employment-based training



Source: OECD, Cornerstone Economics

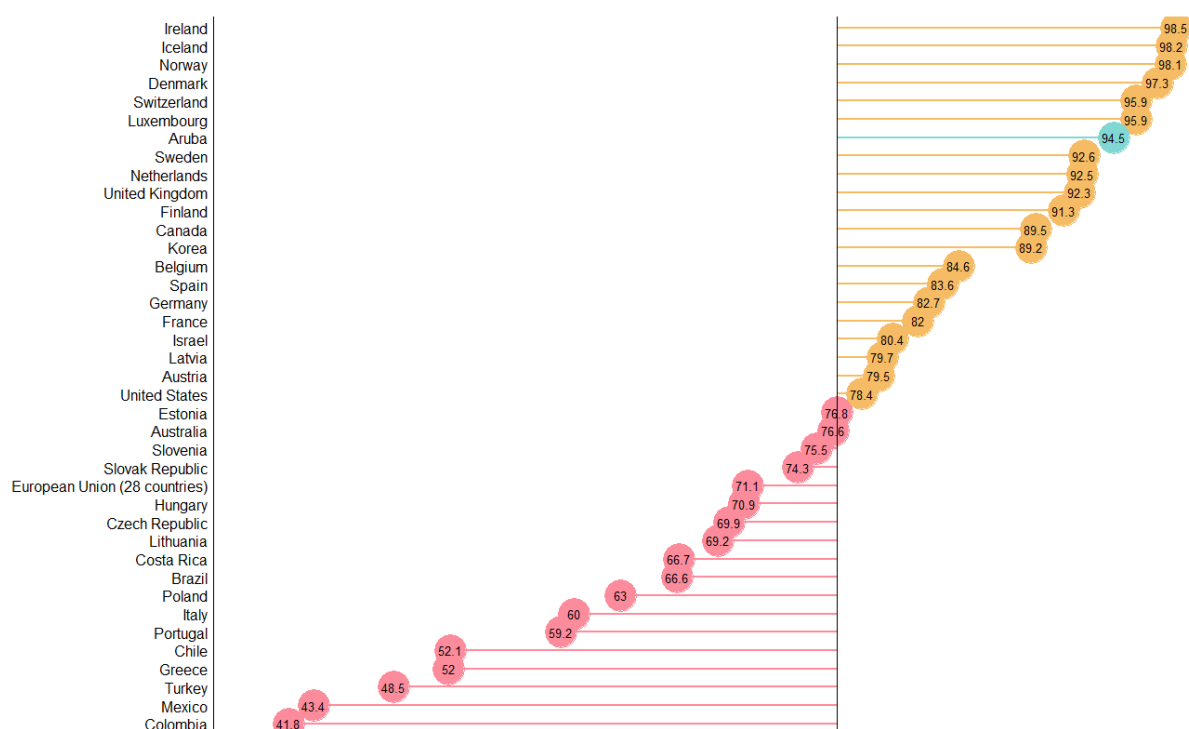
5. Society

Digital technologies affect society in complex and interrelated ways, and all stakeholders must work together to balance benefits and risks

5.1 Individuals aged 55-74 using the Internet

In Aruba, 94.5% of individuals in the age range between 55 and 75 years old use the internet. This implies that internet usage in Aruba is significantly higher than the world average.

Figure 5.1: Percentage of individuals aged 55-74 using the Internet

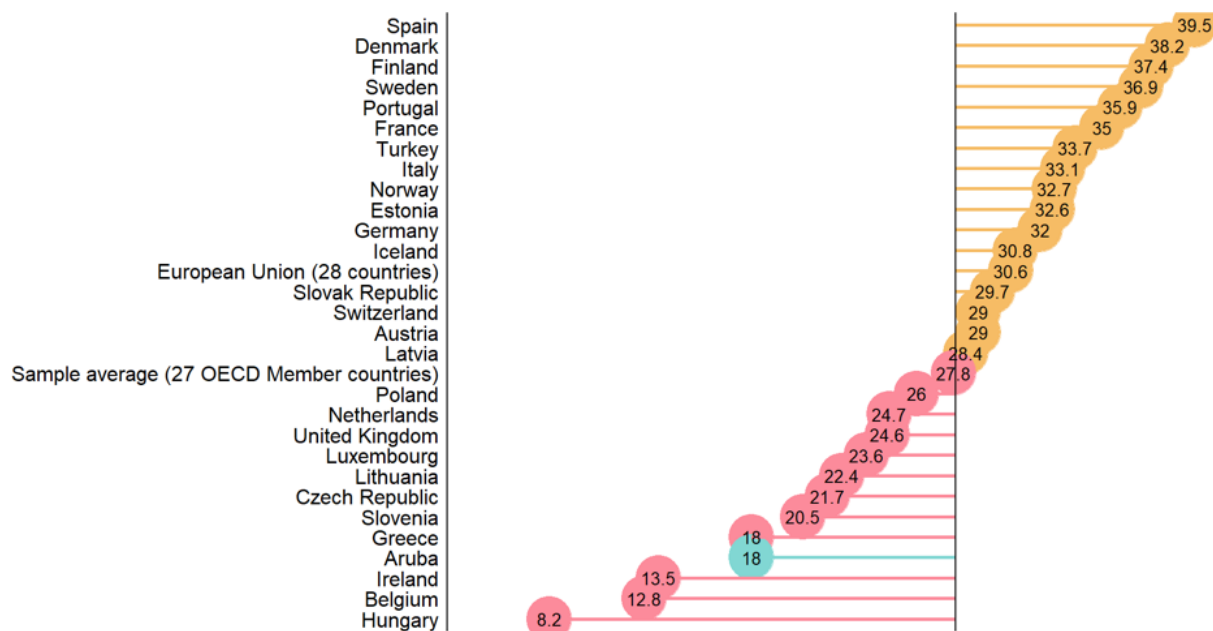


Source: OECD, Cornerstone Economics

5.2 Women as a share of all 16–24-year-olds who can program

On Aruba, girls are unlikely to know how to program, with only 18 percent of women between 16-24 reporting to know how to do so. This while programming is empowering and gives girls an equal shot. It increases their odds of having well-paid STEM jobs. Those jobs also have a potential to reduce the pay gap and boost the average woman's pay significantly. Programming careers also present great flexibility, often supporting flexible work schedules and remote work, which can lead to better work/life balance.

Figure 5.2: Women as a share of all 16–24-year-olds who can program

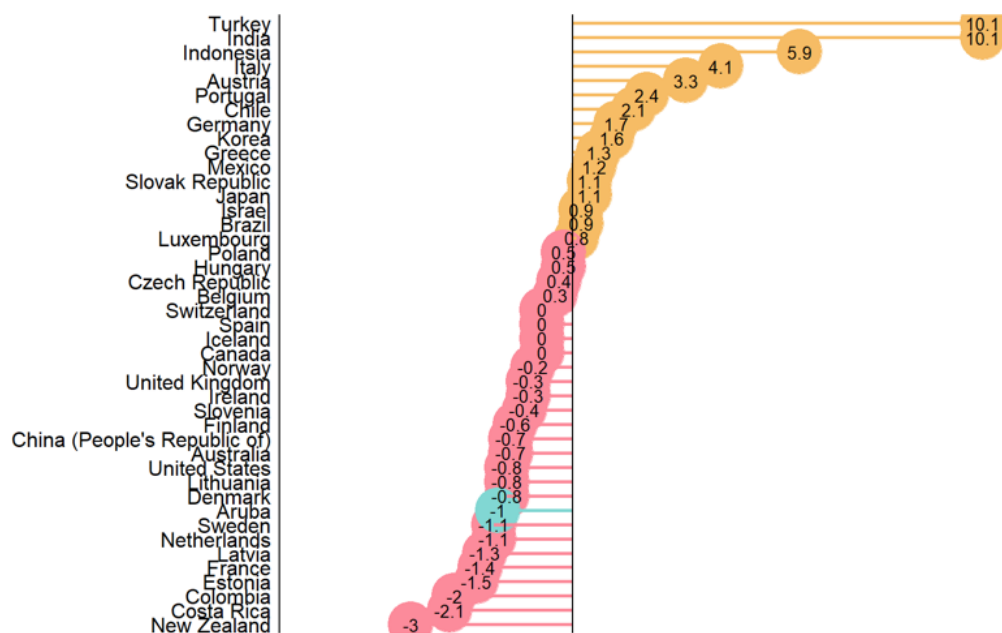


Source: OECD, Cornerstone Economics

5.3 Disparity in Internet use between men and women

In line with most developed countries, internet use disparity between men and women is very limited and the balance is marginally in favor of women. The good equality in terms of internet use appears in stark contrast to the situation in male dominant cultures such as India and Indonesia.

Figure 5.3: Disparity in Internet use between men and women

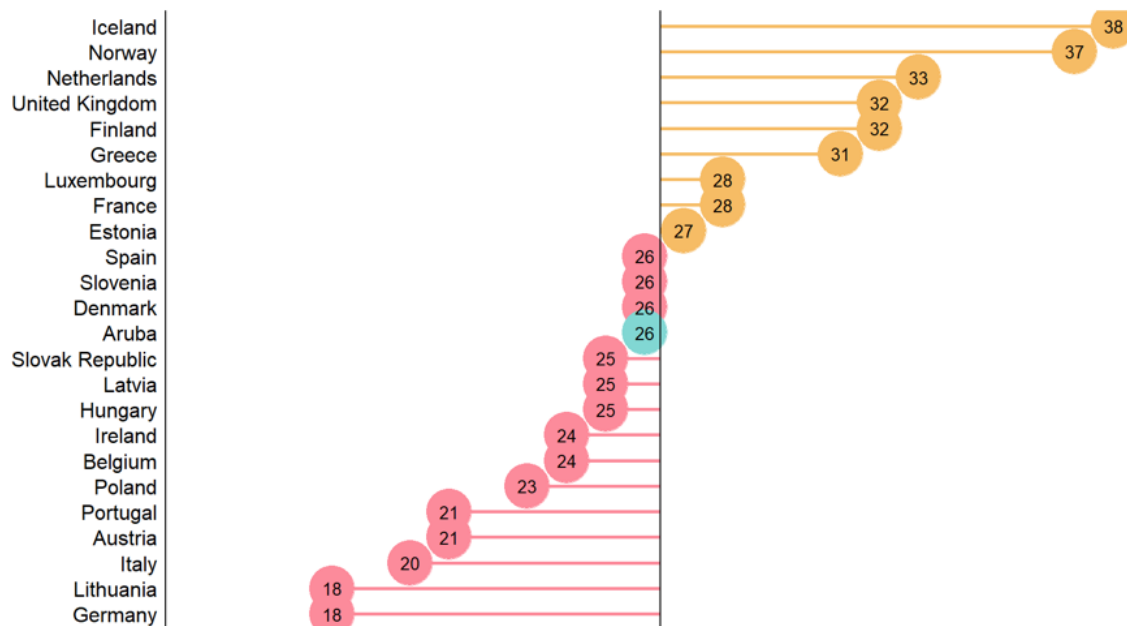


Source: OECD, Cornerstone Economics

5.4 Individuals who use digital equipment at work that telework from home

With 26% of individuals using digital equipment at work and teleworking from home once a week or more, Aruba is right on the OECD average. However, an important caveat to take into consideration is that the OECD data was collected in 2018, which is prior to the COVID pandemic that significantly accelerated the transition to remote work. The expectation therefore is that should this survey be repeated, Aruba would score below the OECD average primarily due to its focus on the tourism service industry which remains largely incompatible with significant remote work.

Figure 5.4: Percentage of individuals who use digital equipment at work that telework from home once a week or more



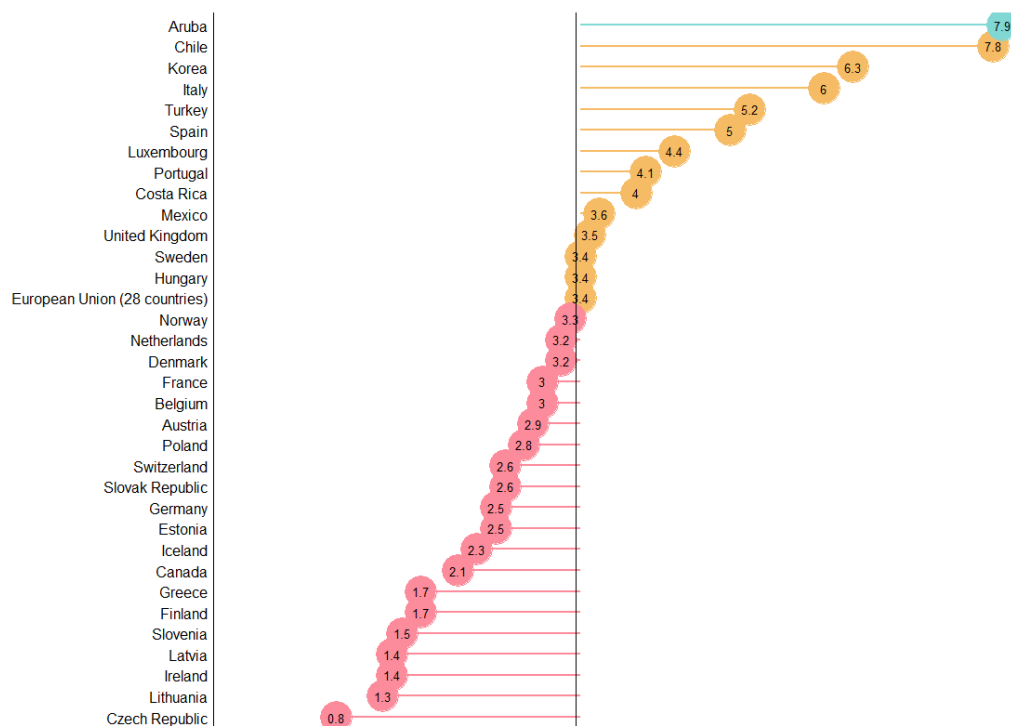
Source: OECD, Cornerstone Economics

6. Trust

Trust in digital environments is essential; without it, an important source of economic and social progress will be left unexploited.

6.1 Internet users experiencing abuse of personal information or privacy violations

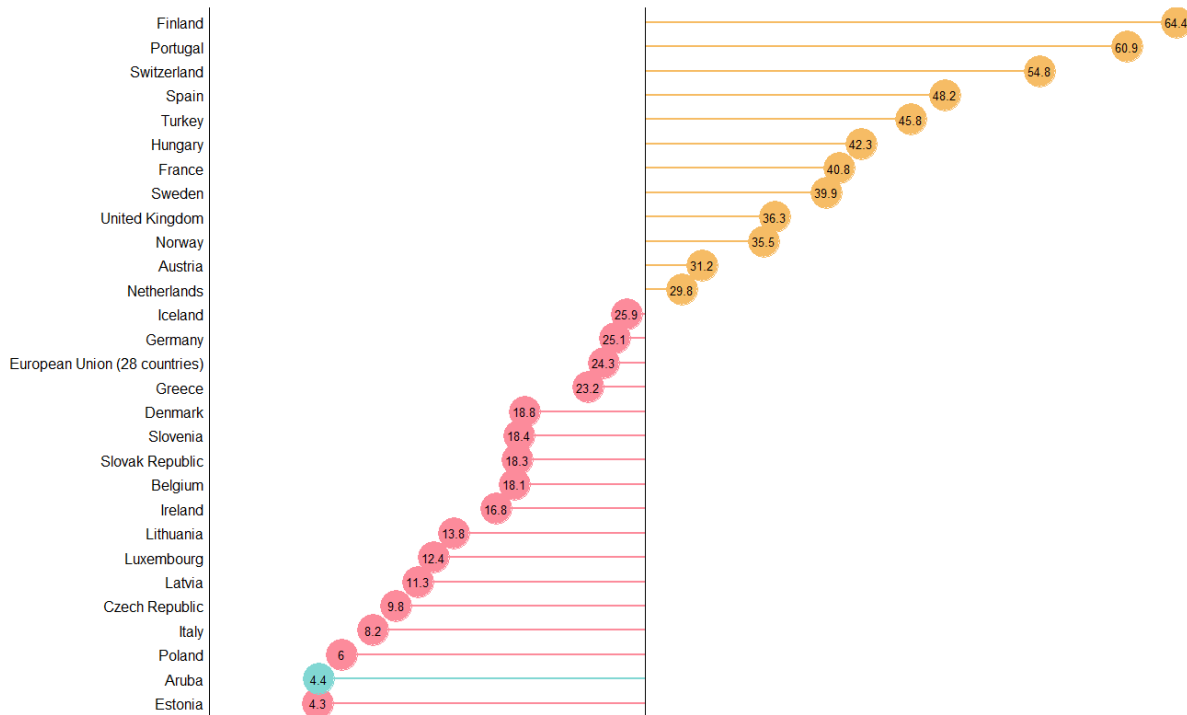
Figure 6.1: Percentage of Internet users experiencing abuse of personal information or privacy violations



Source: OECD, Cornerstone Economics

6.2 Individuals not buying online due to payment security concerns

Figure 6.2: Percentage of individuals not buying online due to payment security concerns



Source: OECD, Cornerstone Economics

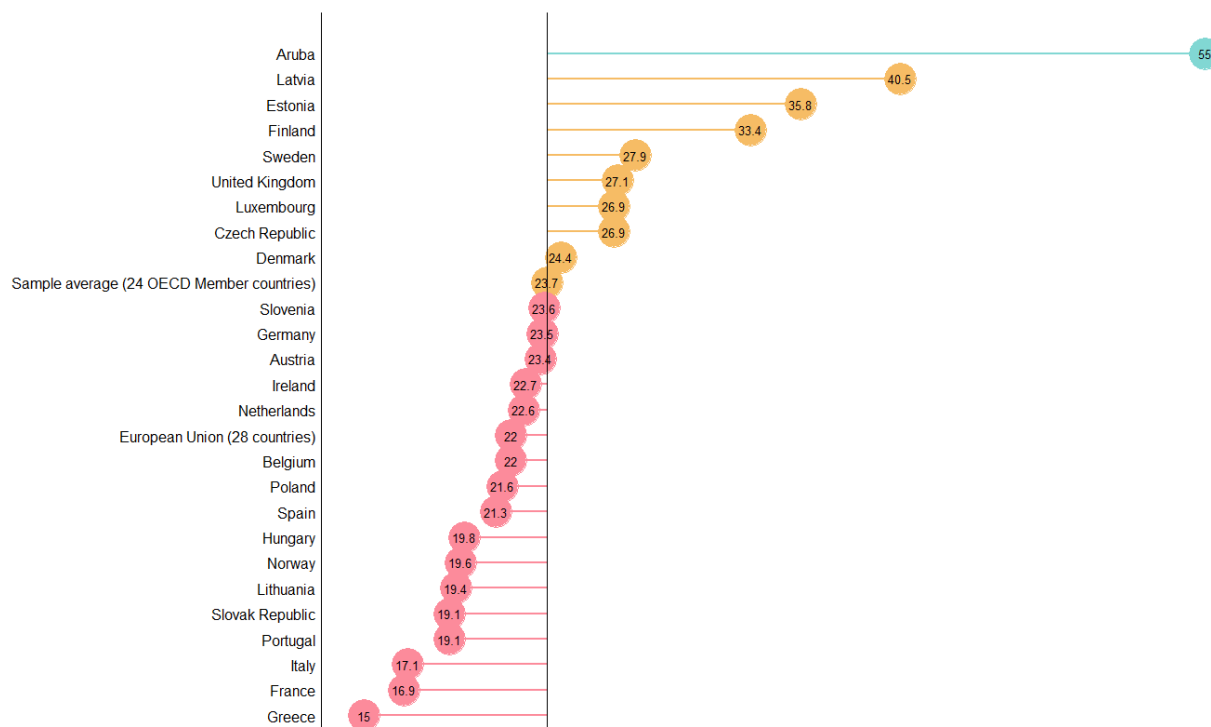
The apparent contradiction between a high percentage of the population being concerned about the abuse of personal information and a seemingly low percentage of individuals that do not participate in purchasing online due to payment security concerns is attributable to binding constraints in access and use. The survey provides a richer context and suggests that trust in the security of the payment system might not be prevalent due to other more binding constraints in access and use, namely:

- 10.3% of the population do not have access to a technology device to complete online payments
- 3.0% of the population does not know how to effectuate online payments
- 13.3% of the population do not have access to a credit card or other payment tools to complete online payments.

In short, access and use related issues amount to 26.6% of respondents not being able to effectuate online payments.

6.3 Businesses in which ICT security and data protection tasks are mainly performed by own employees

Figure 6.3: Percentage of businesses in which ICT security and data protection tasks are mainly performed by own employees



Source: OECD, Cornerstone Economics

In terms of interpretation, the OECD framework considers the level of outsourcing of ICT security and data protection tasks as a proxy for the level of sophistication in this type of activity. That Aruba by far surpasses OECD countries in the level of ICT security and data protection tasks performed by own employees can therefore be interpreted as a significant gap.

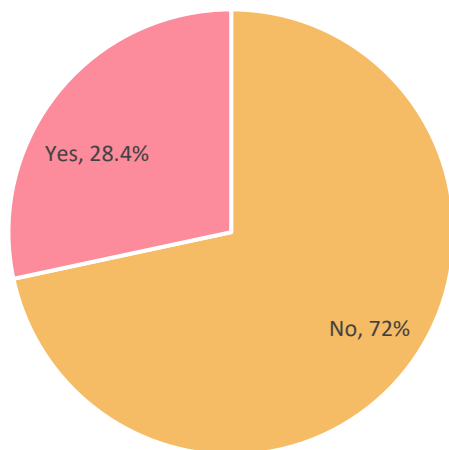
7. Market openness

Digital technologies change the way firms compete, trade and invest; market openness creates an enabling environment for digital transformation to flourish.

7.1 Share of businesses making ecommerce sales that sell across borders

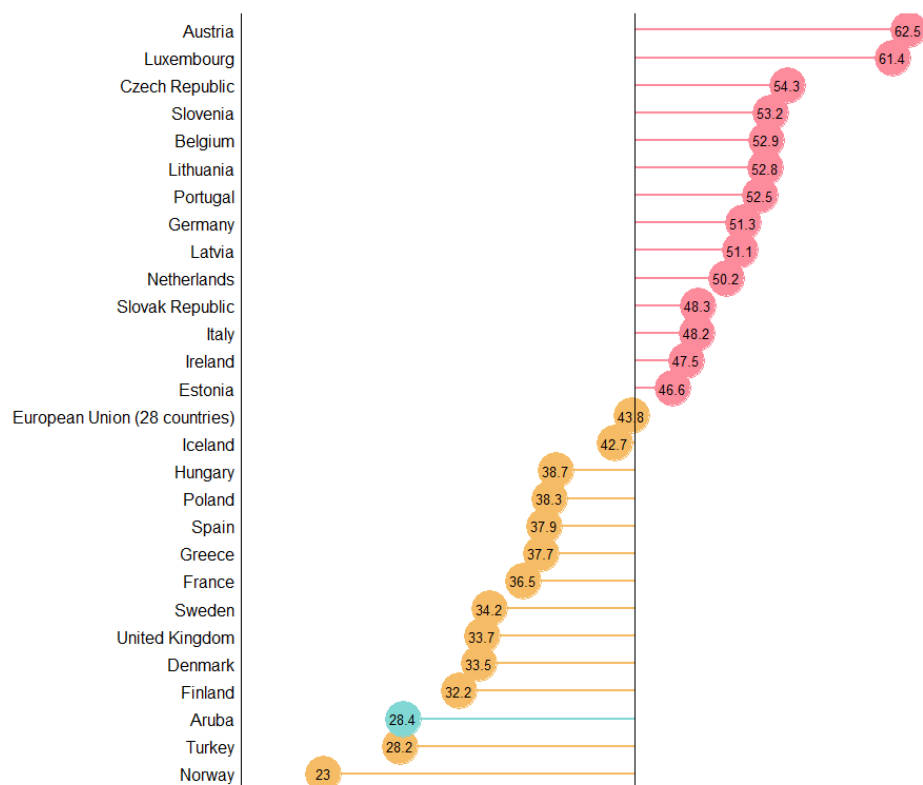
Only 28.4 percent of businesses on Aruba conduct e-commerce across borders. The most obvious benefit of participating to international trade is that it expands the market and enables local organizations to improved performance in terms of efficiency, coordination, and market impacts. For a small tourism dependent island like Aruba it also greatly enhances the capability to diversify exports away from (physical) tourism services.

Figure 7.1.1: Share of businesses making ecommerce sales that sell across borders - Aruba



Source: Cornerstone Economics (2022)

Figure 7.1.2: Share of businesses making ecommerce sales that sell across borders - Comparison Source:



OECD, Cornerstone Economics

Methodology

To inform this study, where possible data was collected from secondary sources, which was supplemented by the execution of two digital divide surveys (Individuals and Businesses).

Individual survey

The individual survey was launched via a webform, which was accessible on mobile/smartphones and PC/desktops. The data collection period was carried out between the 20th of December 2021 and the 26th of March 2022. The survey was administered by 5 surveyors deployed by Cornerstone Economics with a tablet at strategic public spaces. To facilitate both offline and online data collection, Cornerstone Economics created a separate survey to serve each purpose. To ensure inclusivity, particular care was given to ensure the reach those that may not be connected digitally. With this in mind, surveyors visited elderly care homes to collect data for this specific cohort. Cornerstone Economics performed the data collection, monitoring and analysis. This included merging the online and offline survey data. Responses were visualized and monitored daily (according to stratification criteria) throughout the collection period to enable surveyors to target their efforts on specific age groups that required attention. Data validation methods were designed into the survey form to mitigate against data entry errors and/or unintentional outliers. Given the success in obtaining representative sub samples according to age, gender and geographical region, the analysis did not require re-weighting the data.

Business survey

The business survey was launched digitally via a webform, during the collection period that lasted between the 31st of January to the 5th of April 2022. Presentiveness was pursued by business size, according to the definition by the European Union (Micro, Small, Medium, Large enterprises). Given the challenge of securing responses, organization were solicited to participate through diverse channels. Both Cornerstone Economics and Futura Foundation utilized social media (facebook and twitter), while the Aruba Chamber of Commerce sent out a direct email to its business registry. Cornerstone Economics performed the data collection, monitoring and analysis. Data validation methods were designed into the survey form to mitigate against data entry errors and/or unintentional outliers.

Calculation of digital divide estimates

Observations for other countries for benchmarking purposes were obtained from OECD data <https://goingdigital.oecd.org/>. Unfortunately, comparative data was not available for Caribbean peers which share more similar economic characteristics. And additional shortcoming is also that depending on availability per country, the data was collected between 2011 and 2021. Not all indicators listed by OECD were attainable for Aruba, as some indicators could not be collected through surveys and thus relied on third parties to provide. To facilitate comparison, all data were normalized to be between the values 0 and 1, according to the formula: $z_i = (x_i - \min(x)) / (\max(x) - \min(x))$.



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