Digital Skills in South Africa at the Citizen Level

Report by the Knowledge for Innovation Unit of the National Electronic Media Institute of South Africa, hosted at the University of South Africa

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PRETORIA

Digital Skills in South Africa
https://booksup.co.za/index.php/unisapress/catalog/books/56
Research Report | #56 | 195 pages

https://doi.org/10.25159/56

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Print ISBN: 978-1-77615-100-4

E-ISBN: 978-1-77615-085-0

Attribution – Please cite the work as follows:

NEMISA (National Electronic Media Institute of South Africa). 2021. Digital Skills in South Africa at the Citizen Level, edited by H. Twinomurinzi, T. Mawela, N. T. Msweli, and P. Phukubje. 1st ed. Johannesburg: NEMISA & Unisa Press.

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Published by the National Electronic Media Institute of South Africa (NEMISA) with the University of South Africa Press (UNISA), Pretoria.

Published January 2021.

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Acknowledgements

We would like to thank the National Electronic Media Institute of South Africa (NEMISA) for funding the study and the development of this report, along with the NEMISA CoLabs in each of the provinces for contributing, reviewing and commenting on the baseline instrument used to collect data. We are indebted to the interviewees for giving up their precious time to participate in the study.

We acknowledge the following experts who peer reviewed the completed report: Dr Charley Lewis, Prof Nixon Muganda-Ochara and Prof Patricia Alexander.

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Foreword from the NEMISA Board Chair

South Africa is a developing country which has various challenges affecting communities, businesses and the government. Some of these challenges are unique to South Africa, whilst others are common to developing countries and first world countries.

The environmental scan was conducted to determine the current and future supply and demand of 4IR skills in South Africa across various sectors and geographical areas. The study was considered to be imperative for NEMISA to better position itself in order to address current shortcomings and to plan for future demands. The outcomes of the environmental scan would further ensure that relevant skills programmes are offered to the appropriate sector at the correct location.

Albeit the environmental scan being the backbone of the focus areas for NEMISA, further considerations were made to global trends in technological advances and those skills included in the 2020/21 Annual Performance Plan. This would ensure that South Africans are equipped with the skills that would ultimately enable them to compete with global players in developing technological solutions to solve everyday challenges.

It is NEMISA's quest to create a South African citizenry that can consume technological solutions and develop proudly South African digital solutions.

#BuildingACapable4IRArmy

Ms Molebogeng Leshabane
Chair of the Board | NEMISA

Foreword from the NEMISA Acting Chief Executive Officer

We are in the era of the 4IR and it is incumbent upon every individual, all institutions and organisations, and both the private and public sectors to equip themselves with digital skills in order to execute their mandates effectively. NEMISA plays a mandatory role in realising such digital skills. The NEMISA 2020–2024 Strategic Plan will drive the institution towards a world class innovative skills institute that will ensure an empowered South African citizenry with 4IR capabilities (4IRArmy). NEMISA's mission is to catalyse national digital skills for meaningful use of technologies in order to improve the quality of life of all South Africans. This mission cannot be made a reality without the involvement of the work force (labour), as it is the driving force towards production and industry effectiveness.

NEMISA embarked on the environmental scan to find the digital technologies and skills that are required by employees in organisations and government. The scope of the study entailed the ability to learn new software, digital literacy, the ability to use and understand digital media, and digital marketing. The study found that higher costs of digital technology; adjusting to and learning new digital technology; the threat of possible retrenchment; and the lack of required digital skills were some of the challenges employees faced in the workplace. Future digital technology and skills required range from basic computer literacy to advanced digital skills in computer coding, artificial intelligence, machine learning and blockchain technology.

Technological advancements directly influence the changing nature of digital skills. New technologies demand a capable work force that is equipped with skills that complement the change in technology and the market. NEMISA is positioning itself to become a national catalyst for digital skills development for the public and private sectors. It is crucial for all citizens and organisations to have the appropriate digital skills in an ever-changing technological environment. The environmental scan will definitely aid NEMISA to create an enabling digital skilling environment for 4IR technologies and innovation.

Mr Treveen Rabindhnath
Acting Chief Executive Officer | NEMISA

Executive Summary

The environmental scan on digital skills in South Africa at the citizen level is a South African innovation in an emerging field aimed at understanding the state of digital skills in South Africa. The results from the study are designed to inform evidence-based decision-making on digital skills in South Africa, that is, how digital technologies, now integrated into daily living and increasingly integral to economic activity under the 4IR, can be productively and meaningfully used by individuals, organisations and communities.

The complete set of survey data will be provided interactively on the www.k4i.co.za website to enable data enthusiasts and scientists to mine more relationships that are "interesting".[1]

[1] The term "interesting" in data science refers to previously unknown yet important findings that emerge from a deeper examination of the data.

Introduction: A Digital Skills Index for South Africa

Part of the National Electronic Media Institute of South Africa (NEMISA) study's complexity was determining the scope of relationships needed to understand the state of digital skills in South Africa. Therefore, the scope was necessarily broad and intentionally exploratory.

With time, feedback and sufficient critique, the scope will be narrowed to develop a more fitting, nationally appropriate digital skills index for South Africa.[2] Once such an index (or sub-sector-specific indexes) is developed, progress can be measured, and comparison between areas and communities can be evaluated.

The long-term digital skills study aims to develop an index as one of the tools against which to measure South Africa's progress in digital skills.[3] An example of a popular index in a related field is the Information and Communication Technologies (ICT) Development Index (IDI) of the International Telecommunication Union (ITU).

Process for the Final Baseline Instrument

Chapter 3: Methodology describes the process that was used to arrive at the final baseline instrument (the survey). There are three environmental scan phases which together will offer a more holistic picture about the state of digital skills in South Africa:

- The individual level (the current report 2018/2019)
- The organisational level (2019/2020)
- The government level (2019/2020)

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2 An index is a single score made by combining several other indicators, variables or scores – sometimes by straightforward addition but often in more complex ways – in order to measure a key given variable. An index aims to show the status of the key variable, allowing for cross-entity comparison and providing for longitudinal measurement of progress towards the given policy objective.

3 The comparison and analyses of different indexes is not within the scope of this environmental scan.

The report provides an overview of the results from the first phase viz. the individual level. The individual level phase focused on the following nine aspects:[4]

- Digital ownership
- Digital access
- Digital awareness
- Digital usage
- Digital benefits (including digital social inclusion and digital economic inclusion)[5]
- E-skills or 21st century skills
- ICT self-efficacy
- Government to citizen (G2C) interaction using digital platforms
- Poverty and social inclusion

The relationships between these aspects are critical to understanding digital skills interventions at a national, provincial and local level. These relationships say more about where certain aspects have influence: for example, whether having a "lower income" or "being a woman" or "living in a rural area" means that individuals use digital technologies differently.

Findings Validated against Other Data Sets

Where possible, the data has been checked against other studies and reports. For example, the environmental scan data on unemployment reflects similar findings to those from Statistics South Africa. The environmental scan reports an overall unemployment rate of 27.7%, which is close to the Statistics South Africa (Stats SA 2019c, 2) figure of 27.6%.

About the Sample Groups

The final sample that was analysed consisted of 1499 men and 1501 women, with sample groups from different age groups, genders, races, languages and education levels across all the provinces. The size of the sample groups reflected the size of the province. Note that the mandate required that a much higher

4 These are usually called constructs in academia. In this report, we refer to them as "aspects" because they have not yet been empirically verified as constructs.

5 We define "digital social inclusion" as the perception that digital technologies enable the individual to feel included in society, and "digital economic inclusion" as the perceptions that digital technologies enable the individual to feel included in the economy.

percentage of youth (15–34) be studied (63.2%). The actual percentage of youth in South Africa is 35% (Stats SA 2019b).

Location and Context Matter

The findings from the data suggest that digital technologies appear to be levelling the gender divide in employment, income and socioeconomic opportunities – the digital behaviours of men and women are quite the same.

This report highlights evidence that supports a differentiated approach to digital skills interventions by province and population settlement. There is a clear need to create unique digital skill pathways that result in well prepared individuals for the Fourth Industrial Revolution (4IR) and the future of work in South Africa. For example, the data shows that individuals in urban areas are more in tune with the inter-connected ethos of the 4IR as their digital behaviours are much more participative while those in rural and township areas are at the digital usage stage. Those in peri-urban areas have not really began to use digital and are at the stage of *access to digital technologies*. Access to digital technologies remains a challenge in peri-urban areas.

Digital skills pathways will need to be customised per occupational sector in close partnerships with organisations in every sector and population settlement such that those trained will have jobs waiting for them.

Prof H Twinomurinzi
Professor | 4IR
Applied Information Systems Department | UJ

Chapter 1: Key Statistics and Insights

This chapter sets out some of the key findings that emerged from the more detailed analysis found in subsequent chapters.

1.1 Digital Skills and Gender

There were not many overall digital differences between men and women despite a comprehensive statistical cross-loading of data across the different digital aspects (see Appendix A and B). This is an interesting finding as it suggests that overall men and women in South Africa interact with digital technologies in quite the same way.

The gender differences are only pronounced in two aspects, viz: digital economic exclusion in the Western Cape, and online banking in the rural areas of South Africa.

In the Western Cape, 78.7% of women who do not participate in online forums for business, but experience digital social inclusion, are likely to experience digital economic exclusion compared with 54.8% of men (see Appendix A). This finding could suggest that women in the Western Cape require a little more nudging to participate in online forums for business in order to experience digital economic inclusion. Digital skills efforts for business in the Western Cape should, therefore, be more intentional for women.

In rural areas, 56.4% of women who use online banking are most likely to have no income, compared with 53% of women who do not use online banking and earn [R0–R5 000]. This phenomenon might be better understood in the context of the following "non-digital factor", that is, 61.9% of men who are unemployed are most likely to have no income whatsoever. In contrast, 41.7% of unemployed women in the rural areas are likely to earn [R0–R5000]. This finding suggests that unemployed women in rural areas find means of earning income despite being unemployed. A better understanding of this phenomenon requires further investigation.

1.2 Digital Factors per Province

Decision tree analysis was used to identify digital factors[6] per province. We define a "digital factor" as a component of a digital aspect that is statistically associated with an important component of an aspect that was measured at a p-

[6] The report defines a digital factor as a digital aspect that is statistically associated (at p-value 0.05 i.e. there is 95% certainty of a cause-effect relationship) with an important aspect we measured. In this report the focus was on the three areas that affect South Africa the most: unemployment, poverty (income), and social and economic inclusion.

value of 0.05, that is, there is 95% certainty of a cause-effect relationship. In this report the focus is on the three areas that affect South Africa the most, viz: unemployment, poverty (income) and digital social/economic inclusion.

The detail of the provincial analysis can be found in Appendix A. The following tables offer a comparative provincial overview of income, employment, digital social inclusion and digital economic inclusion. The digital factors per province are vastly different.

1.2.1 Digital Factors of Income by Province

The digital factors of income by province are different (see Table 1) despite [R5001–R10 000] being the most common income range for all the provinces save for the Free State and the Northern Cape where it is no income.

Table 1: Digital factors of income by province

Province	Most common income range (R)	%	2nd most common income range (R)	%	Digital factor 1	Digital factor 2
Eastern Cape	5001–10 000	64	No income	15.1	Personal email	
Free State	No income	50.3	5001–10 000	37.2	Use e-wallet/mobile money to move money	
Gauteng	5001–10 000	65.3	10 001–20 000	16	Cell C	
KwaZulu-Natal	5001–10 000	41.5	No income	24.9	Facebook	
Limpopo	5001–10 000	61.1	No income	16.2	Use Shoprite/Checkers to move money	
Mpumalanga	5001–10 000	44.8	No income	36.4		
North West	5001–10 000	53.3	No income	22	Participate in online forums for business	Personal email
Northern Cape	No income	40.5	5001–10 000	30.6		
Western Cape	5001–10 000	54.1	No income	28	Personal email	Instagram

1.2.2 Digital Factors of Employment by Province

Employment levels per province are also different with the highest employment being 81.9% in Gauteng and the lowest being the Free State with 17.9%. The digital factors of employment are also different (see Table 2).

Table 2: Digital factors of employment by province

Province	Employed (%)	Unemployed (%)	Digital factor 1	Digital factor 2
Eastern Cape	79.70	20.30	Use the internet to search for jobs	
Free State	17.20	45.50		
Gauteng	81.90	14.90	Access to the internet at home	Digital economic inclusion
KwaZulu-Natal	51.50	30.50	Use the internet to search for information	Email
Limpopo	69.20	18.40		
Mpumalanga	49.80	25.90	Online banking	
North West	66.30	27.20	Perception of IT in their degree	
Northern Cape	35.50	43.40		
Western Cape	62.70	19.20	Online banking	Participate in online forums for business

1.2.3 Digital Factors of Digital Social Inclusion by Province

The degree of digital social inclusion, that is, the perception that digital technologies enable an individual to feel included in society, are highest in KwaZulu-Natal (66.9%) and lowest in North West (21.5%). The digital factors are also very different per province (see Table 3). Those that appear more than others are: Use the internet to keep in touch with others (3), YouTube (3), Digital economic inclusion (2) and Participate in online forums to negotiate (2).

Table 3: Digital factors of digital social inclusion by province

Province	%	Digital factor 1	Digital factor 2	Digital factor 3	Digital factor 4
Eastern Cape	64.4	Use the internet to keep in touch with others	Participate in online forums to collaborate		
Free State	40	YouTube			
Gauteng	58.1	Digital economic inclusion	Monthly spend on mobile data	Use the internet to keep in touch with others	MMS

KwaZulu-Natal	66.9	WhatsApp	YouTube	Participate in online forums for business	
Limpopo	24.8	Participate in online forums to negotiate	Google+	Use e-wallet/mobile money to move money	
Mpumalanga	43.5	Online forums for social interactions with family/friends	Participate in online forums to negotiate		
North West	21.5	Use the internet to keep in touch with others	Participate in online forums for social interactions with family/friends	Online banking	
Northern Cape	48.3	Entertainment	Use Shoprite/Checkers to move money		
Western Cape	43.1	Digital economic inclusion	Use the internet to pay bills	YouTube	

1.2.4 Digital Factors of Digital Economic Inclusion by Province

The highest perception of digital economic inclusion, that is, the perception that digital technologies enable one to feel included in the economy, is in Gauteng (46.9%), while the lowest is in Limpopo (10.3%). While the digital factors are also different (see Table 4), digital social inclusion stands out as the strongest digital factor occurring in all provinces except KwaZulu-Natal and the Eastern Cape. The other common digital factor is online banking (4). These findings suggest that digital skills efforts targeted at improving digital economic inclusion must necessarily include digital social inclusion and online banking elements.

Table 4: Digital factors of digital economic inclusion by province

Province	**%**	**Digital factor 1**	**Digital factor 2**	**Digital factor 3**	**Digital factor 4**
Eastern Cape	41.8	Use the internet to search for business opportunities	Online safety		
Free State	24.8	Digital social inclusion			

Gauteng	46.9	Digital social inclusion	Monthly spend on mobile data	Online banking	Participate in online forums to make decisions
KwaZulu-Natal	32.5	Online banking	Use the internet to search for business opportunities	WhatsApp	
Limpopo	10.3	Digital social inclusion	Google+		
Mpumalanga	20.1	Skype	Digital social inclusion		
North West	15.4	Digital social inclusion	Online banking	Facebook	
Northern Cape	16.5	Digital social inclusion	Online banking	Use the internet to keep in touch with others	
Western Cape	24.8	Digital social inclusion	Google+	Participate in online forums for business	

1.3 Digital Factors by Population Settlement

Decision tree analysis was also used to identify digital factors in rural, peri-urban, township and urban areas. A more detailed presentation per population settlement is provided in Appendix B. The following sections present a comparative overview.

The digital factors are more distinct per population settlement. The digital factors in peri-urban areas are themed around digital device ownership, compared with rural and township areas which are themed around digital usage. In urban areas, the digital factors are oriented towards digital participation.

1.3.1 Digital Factors of Income by Population Settlement

In terms of income, peri-urban areas have no income as the primary income range, compared with the others which are in the [R5001–R10 000] range (see Table 5). For the others, the second most common income range is no income.

It is clear that the digital factors of income are highest in urban areas with seven digital factors, compared with peri-urban areas (1), followed by townships (3) and rural areas (4). It is interesting to note that online safety is a digital factor in rural areas, but not in the other population settlements.

Table 5: Digital factors of income by population settlement

	Peri-urban	**Township**	**Rural**	**Urban**

Most common income range (R)	No income	5001–10 000	5001–10 000	5001–10 000
%	40.8	47.5	50.4	50.6
2nd most common income range (R)	5001–10 000	No income	No income	No income
%	36.8%	28.5	23.0	25.5
Digital factor 1	MMS	Participate in online platform for business	Online safety	Facebook
Digital factor 2		Google+	Use the internet to search for business opportunities	Use the internet to search for jobs
Digital factor 3		Use the internet to search for jobs	Participate in online platform for business	Online banking
Digital factor 4			Online banking	Monthly spend on data
Digital factor 5				Entertainment
Digital factor 6				Personal email
Digital factor 7				Use the internet to search for business opportunities

1.3.2 Digital Factors of Employment by Population Settlement

The digital factors of employment are disparate with no digital factor in peri-urban areas (see Table 6). The employment figure is also lowest in this region at 38.4%.

If online banking is considered as transactional, then it can be seen that the digital behaviour of townships is either *transactional or hedonic (pleasure seeking)*. The digital behaviours in rural areas related to employment are much more *hedonic* (Facebook and Entertainment) and *task-oriented* (ICT self-efficacy). The digital behaviours in urban areas associated with employment are much more *participative* (for information, jobs and family).

Table 6: Digital factors of employment by population settlement

	Peri-urban	Township	Rural	Urban
Employed	38.4%	57.8%	58.4%	58.8%
Unemployed	38.4%	31.8%	28.7%	23.0%
Digital factor 1		Online banking	Entertainment	Use the internet to search for jobs
Digital factor 2		Entertainment	Facebook	Use the internet to search for information
Digital factor 3			ICT self-efficacy	Participate in online platforms for social interactions with friends/family

1.3.3 Digital Factors of Digital Social Inclusion by Population Settlement

The highest level of digital social inclusion is in townships, and the lowest is in peri-urban areas (see Table 8). The six digital factors in urban areas relate to either participation or decision-making. The digital factors in rural and township areas are varied. However, in townships, two of the four digital factors relate to digital device ownership – laptop and smartphone.

There is only one digital factor of digital social inclusion in peri-urban areas, access to the internet at home. Further investigation is required to understand this phenomenon.

Table 7: Digital factors of digital social inclusion by population settlement

	Peri-urban	Rural	Township	Urban
Digital social inclusion	28.8%	44.5%	52.5%	48.9%
Digital factor 1	Access to the internet at home	Use the internet to keep in touch with others	WhatsApp	Use the internet to keep in touch with others
Digital factor 2		Participate in online forums to make decisions	Smartphone	Participate in online forums to make collaborate
Digital factor 3		WhatsApp	Use e-wallet/mobile to move money	Use the internet to make decisions
Digital factor 4		Personal email	Laptop	Use the internet to pay bills
Digital				Use the internet to

factor 5				search for business opportunities
Digital factor 6				Google+

1.3.4 Digital Factors of Digital Economic Inclusion by Population Settlement

The highest level of digital economic inclusion is in urban and township areas (30.8% and 30.7% respectively), and the lowest is in peri-urban areas. Urban areas have seven digital factors, one of which is use the internet to complete online training courses. There is only one digital factor for peri-urban areas – digital device ownership of a laptop.

Table 8: Digital factors of digital economic inclusion by population settlement

	Peri-urban	Rural	Township	Urban
Digital economic inclusion	17.6%	20.8%	30.4%	30.8%
Digital factor 1	Laptop	Use the internet to search for business opportunities	Online banking	Use the internet to pay bills
Digital factor 2		Online banking	Use the internet to keep in touch with others	Use the internet to search for business opportunities
Digital factor 3		Participate in online forums to exchange information	Participate in online forums for social interactions with friends/family	Online safety
Digital factor 4			Participate in online forums for business	Participate in online forums to exchange information
Digital factor 5			Personal email	Use the internet to complete online training courses
Digital factor 6				Participate in online forums for business
Digital factor 7				MMS

1.4 Other Aspects

1.4.1 Educational Attainment and Employment

Whilst having a higher level of formal education does not necessarily guarantee employment, it remains a key job enabler. For example, 74.6% of the respondents without post-secondary education, were unemployed, whereas only 15% of those with a postgraduate degree were similarly affected (see Appendix F). Formal education thus remains a key channel for upskilling and a means out of unemployment. A longitudinal analysis is required to establish whether the employment-education phenomenon continues in the context of the 4IR.

1.4.2 Digital Ownership of Smartphones

Smartphones are the digital technologies with the highest levels of ownership (86.4%), while 38.2% own laptops. These are platforms that offer maximum opportunities for digital skills interventions.

1.4.3 Multiple Mobile Access Paths

Nearly 22% of the respondents report using more than one mobile network. This may be due to a variety of reasons, such as on-net calling discounts, free data for access to certain social media apps (e.g. WhatsApp) or internet sites (e.g. Wikipedia), or geographical differences in network coverage or quality. None of these issues are explored here, but equally none appears on the face to be relevant to digital skills levels.

1.4.4 Access to the Internet

Although access to the internet largely takes place from home (67.2%), free public WiFi access is also widespread (31.6%). This suggests that public investment in WiFi appears to be yielding returns, and that free public WiFi provision could well be leveraged as an opportunity to provide digital upskilling.

The low incidence of access at libraries (19.3%), school campuses (12.5%) and community centres (10.8%) needs to be investigated further. These results can be interpreted in a number of ways, for example, it is important to invest in internet hotspots at community centres or increase awareness of internet services at community centres.

1.4.5 Radio and TV Opportunities

TV viewership (68.2%) and community radio listenership (54.8%) are widespread. This suggests that these two channels should be part of the digital technologies used in digital skills interventions.

1.4.6 Digital Use – Why People Use the Internet

The internet is primarily used for five main things:

- Searching for information (69.3%)
- Entertainment (61.5%)
- Keeping in touch with others (49.8%)
- Online banking (40.9%)[7]

[7] It should be noted that this question was asked before explaining the meaning of online banking. It was later explained to the participants after which usage numbers increased. This

- Searching for business opportunities (32.3%)

The high percentage of people who search for entertainment validates, to some extent, NEMISA's focus on creative new media. The need to keep in touch with others is focused on through some of NEMISA's digital skills courses around social media. This area may need to be developed further.

1.4.7 Online Banking Awareness versus Usage

There is a significant gap between participants' awareness of online banking (83.8%) versus its actual usage (55.7%).[8] However, usage is significantly lower amongst the unemployed (36.6%) and the retired (8.6%), with awareness also significantly lower (60%) amongst the latter retired. Further research is needed to understand the significant gaps between usage and awareness of online banking.

1.4.8 Online Learning

Those who use public internet areas (31.6%) are typically the same ones who use the internet to complete online courses (14.9%) (see Appendix C). As seen earlier, it is mainly those in urban areas who seem to engage in online learning as a means of digital economic inclusion.

This low level of online learning uptake needs further investigation. However, public free internet areas might offer avenues to promote online courses. Similarly, the data and available reading suggests that it is necessary to create digital skills pathways for people to learn to use the freely available learning content productively (Robeyns 2005).

1.4.9 Accreditation a Factor in Completing Online Courses

Of the 14.9% who take online courses, 60.7% identify accreditation as an important factor in completing the course (see Appendix C). This reflects that individuals who take online courses place higher value on those courses that lead to accredited qualifications. The data also suggests that 39.3% still take online courses even though they are not accredited. The findings suggest that digital skills efforts need to consider accreditation as an important mechanism.

1.4.10 Gamification in Online Courseware

The high desire for entertainment – it is second on the internet usage list – suggests that traditional learning may benefit from incorporating entertainment elements within the learning process, such as "gamification" and "edutainment".

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shows that some digital technologies are used without the users necessarily understanding the label that accompanies the technology.

8 The meaning of online banking was explained here.

1.4.11 Information Literacy Training

If individuals are using the internet primarily to search, it also means that more and more students and academics are finding their content online, and that copy-and-paste plagiarism is on the increase (CapeTalk 2019). The easy access to information means that individuals are not necessarily engaged in the traditional educational activity of working through the creative and cognitive processes of how to think and to engage with disparate information.

At the same time, this is a digital world and education must include the internet and digital technologies. Learners need to be taught to move beyond mere information retrieval, and educators need skills to track plagiarism. Educators also need to encourage more critical and cognitive thinking using digital technologies.

1.4.12 Digital Usage – Smartphones and Laptops

The high usage of a smartphone (87.9%), followed by a laptop (49.6%) and a tablet (36.3%) suggests that these devices are likely channels for content, education and entertainment. However, it is still important to teach digital literacy across all devices.

1.4.13 Benefits of Digital Technologies

Access to information (72.2%), digital social inclusion (47.8%) and finding employment (44.9%) are the key perceived benefits of access to digital technologies and may well be leveraged to incentivise digital upskilling.

1.4.14 Online Safety

The fact that 31.1% of the respondents rarely or never back up their information and documents, and that over 1 in 10 (12.6%) have been victims of cybercrime or fraud, suggests the need for online safety to be included in any digital upskilling programme.

Further, the fact that many (75.6%) do not feel safe using free public internet (utilised by 31.6% of the respondents), suggests that online safety in public spaces needs to be researched so that it can be improved significantly.

1.4.15 ICT and General Self-Efficacy

Self-efficacy refers to an individual's judgement of their capabilities to organise and execute a course of action needed to attain certain tasks. Self-efficacy has the greatest influence on the choices of behaviour in answer to the question: "Can I do this?"

ICT self-efficacy is an adapted instrument based on general self-efficacy. It measures an individual's ability to complete tasks successfully using ICT. ICT self-efficacy is important in an environment driven by digital technologies. Individual perceptions towards digital technologies and patterns on digital usage are significant towards building digital citizenship.

A large number of the respondents (80.6%) rate themselves highly regarding general self-efficacy, a trait which has been shown to determine how well skills will be used. By contrast, only 58.8% believe they can complete tasks using ICT. This points to the need for more digital skills training.

ICT self-efficacy interventions are likely best targeted at the unemployed, whose levels of ICT self-efficacy (50.5%) are significantly lower than those for the employed (62.6%) and students (63%), although more research into the phenomenon is necessary.

1.4.16 Trust in Government Websites and Language

The lack of trust in government websites (45.8%) is a cause for concern and needs to be addressed. Likewise the desire by many respondents (69.5%) for government content in their home language suggests that this too needs to be addressed.

1.4.17 Lack of Interaction with Digital Government

There is a general lack of interaction with government websites or apps, with only 45.3% reporting to have visited any of these, and low percentages having interacted with government services, such as applying for a government service online (29.4%), logging a query (15.3%) or paying for a service (12.8%).

The reasons for this need further investigation before effective remedial interventions can be proposed. However, it does indicate significant opportunities for digital transformation in the government to make its services simpler and more accessible. It also suggests that digital skills training is necessary for users and marketing to create awareness.

1.4.18 Customer-centric Digital Government

The widespread levels of dissatisfaction with responses received from government officials/departments on social media sites and websites gives cause for concern: 69.8% report that government departments/officials never or rarely respond to communication on social networking sites, with 72.2% expressing dissatisfaction with online responses from government staff, and 64.9% stating that they never or rarely successfully complete what they have tried to do on a government website.

These results suggest a great deal of work needs to be done to address responsiveness in digital government services.

1.4.19 Digital Technologies and Poverty and Social Inclusion

A higher income is associated with a wide range of digital skills, including: searching for jobs on the internet, completing online training courses, banking and shopping online, paying bills online, and using the internet to market goods (see Appendix C).

A lower income, by contrast, is associated with moving money using large retails stores (e.g. Shoprite/Checkers), and using the internet for entertainment. It is also those with a lower income who tend to be victims of cybercrime or fraud.

1.4.20 21st Century Skills

In terms of e-skills or 21st century skills, people with a higher income and who are employed have higher information and data literacy and feel safer online (see Appendix C). On the other hand, those with a lower income tend to develop problem-solving skills more intensely.

Chapter 2: Background on the Environmental Scan on Digital Skills

The practical aim of the digital skills agenda is to embed the ability to productively use a broad range of digital technologies into people's lives. This comes from the understanding that digital technology is changing the way people work and live. Accessing digital technology is not enough. To participate fully in the digital environment, individuals and entities need to know how to appropriate the technologies.

The Knowledge for Innovation Unit (K4I) of NEMISA is tasked with looking for appropriate, often innovative, ways to address systemic problems and other inefficiencies and weaknesses in achieving digital learning and digital skills success. This would include: finding ways to identify entrants with potential who do not have the normally required entrance qualifications; supporting under-prepared students; and introducing work-integrated learning and practical components into programmes.

There is limited research available on the extent and status of digital skills in South Africa. Nor is there any in-depth assessment available of key digital skills indicators. Similarly, no systematic audit of digital skills has ever been conducted.

Therefore, the K4I was tasked with conducting an exploratory environmental scan of the concept of digital skills and their key indicators in South Africa. Accordingly, the purpose of the exploratory study presented here was to answer the primary question: Where are we in South Africa in terms of our digital skills?

2.1 Where Are We in Terms of Our Digital Skills?

After a number of literature reviews on digital skills (see Appendix E), it was noted that there is no single fundamental template that could claim to succinctly define and cover the full concept of digital skills. Further, digital skills are contextualised differently across a wide range of individuals, organisations and sectors. As a result, it was necessary to create a separate, specific baseline survey around each of the main sectors. Therefore, the broad primary question was broken down into three supporting and more concise questions:

- Phase 1: Where are we in terms of digital skills in South Africa at the individual level?
- Phase 2: Where are organisations in terms of digital skills in South Africa?
- Phase 3: Where is government in terms of digital skills in South Africa?

This report is based on the baseline survey instrument developed to answer Phase 1 of the broader baseline survey on digital skills in South Africa. Phase 2 and 3 are under way for 2019/2020.

2.2 Assessing Digital Skills

The concept of digital skills embraces many aspects, several of which are of particular interest in the development of a digital skills survey instrument appropriate to the South African context.

2.2.1 21st Century Skills

The demand for graduates who can quickly adjust to the fast-paced changes in the digital world is no longer dependent on educational proficiency alone. It is increasingly affected by non-technical or "soft" skills and experience. Employers prefer graduates for their non-technical skills over and above their technical skills (Ghouse, Chaudhary and Garg 2018). Technical skills are seen as the minimum, while non-technical skills are key. Consequently, employers are frustrated when they have to deal with graduates who do not have any non-technical or "soft" skills.

There is a considerable body of literature pointing out that the notion of digital skills is far broader than mere technical proficiency. For the purposes of the survey we have employed the notion of e-skills or 21st century skills, that is, non-technical or "soft" skills (Van Laar, Van Deursen, Van Dijk and Haan 2017), which represent the range of non-technical abilities required to engage with digital technologies and to use digital resources effectively. These 21st century skills are grouped under the following five categories:

- Information and data literacy (ability to comprehend digital information)
- Communication and collaboration (connect and share in a digital environment)
- Digital content creation (create and edit content using digital artefacts)
- Online safety (protect information, ensure privacy and stay safe in the digital world)
- Problem solving (identify digital resources to solve and make decisions for problems and opportunities)

Information and data literacy refers to the ability to identify, locate, retrieve, store, organise and analyse digital information, but also being able to judge its relevance and purpose. Communication and collaboration highlights the ability to communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, and interact with and participate in online communities and networks.

Digital content creation broadly refers to the skills to create and edit new content (for instance from word processing to images and video) and also produce creative expressions, media outputs and content; but also deal with and apply intellectual property rights and licences. We limited this aspect to the awareness of the legal and/or copyright implications of using content sourced from the internet.

Online safety is understood to be the skills to protect personal data, personal details and digital identity, and the ability to ensure safe and sustainable use of the internet and overall awareness of cybersecurity threats.

Problem solving skills represent the ability to identify the necessary digital resources, make informed decisions on the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, use technologies creatively, and solve technical problems.

2.2.2 Self-efficacy

Self-efficacy relates to how an individual answers the classical question, "Can I do this?" (Bandura 1977). Thus, self-efficacy relates to an individual's judgement of their capabilities to organise and execute a course of action required to attain designated types of performances. Self-efficacy has been shown to be a good factor of academic and career-related choices and performance. ICT self-efficacy similarly relates to an individual's judgement of their ability to perform tasks using ICT.

There is an inherent epistemology in self-efficacy that it is primarily important for an individual to depend on the self for the achievement of desires. Self-efficacy determines to a great extent the choices of behaviour (Evans 1989). The principle aspects of self-efficacy are desire, thought processes and actions. These three determine the individual's choice of activities and environments, effort expenditure, persistence, thought patterns, and reactions when faced with obstacles. People who have a high self-efficacy tend to be resilient despite repeated rejection.

In the context of the 4IR, where the competitive environment is much steeper, there are bound to be more obstacles especially when it comes to using new technological devices.

Chapter 3: Methodology

A first set of questions was compiled based on the results of literature reviews on digital skills and related concepts such as 21st century skills (see Appendix E). The NEMISA K4I and CoLab teams then met and ran a workshop around the questions. This enabled the baseline questions to be made locally relevant to South African conditions while retaining the digital skills perspective. The questions were adapted, a few were combined and any ambiguities were negotiated until consensus was reached. The workshop was attended by the people in the list of collaborators. The final set of approved questions was then presented to data collection and statistics experts. The questions were re-worded to maintain their meaning while, at the same time, making them appropriate for data collection and statistical analysis. The final set of questions was then circulated to the NEMISA team. The changes to the final set were included in the final survey questionnaire.

A pilot test was conducted to establish the efficacy of the survey using 120 data collection points from three areas – Greater Taung, a rural area in North West; Bramley, an urban area in Gauteng; and Alexandra, a township area in Gauteng. The pilot study revealed some inconsistencies in the questions, mainly in the phrasing of the questions.

The inconsistencies were fixed so that the respondents could understand them better. These changes were adopted into the final baseline survey without affecting the meaning of the questions. The final set of questions is presented in Appendix G.

3.1 Reliability and Validity

The nature of exploratory research designs such as this study means that validity (measuring the right thing) and reliability (consistently collecting the right data) cannot be defined up front, but rather that focus groups, such as expert panels and literature reviews, can be used to ensure validity and reliability (Bhattacherjee 2012; Cypress 2017). The report identifies the members of the expert panel who were involved in the research in the list of collaborators.

3.2 Ethical Clearance

Ethical clearance was obtained from the UNISA School of Computing Ethical Committee. A copy is available in Appendix D.

3.3 Population, Sampling and Data Collection

Sampling followed both a *non-probability convenience sampling technique* in selecting the towns from where data would be collected, and a *random sampling*

technique in selecting the participants to be interviewed. The sample of towns was split among urban, township, peri-urban and rural areas (see Table 9). The data was collected in all nine provinces of South Africa as indicated as three clusters of provinces: northern provinces, central provinces and southern provinces. The use of three clusters was only for the purposes of project planning.

The survey preparation involved mapping out all the identified areas and the personnel involved. There was a briefing and training of fieldworkers to familiarise them with the subject matter and the survey instrument. The briefing and training of fieldworkers was conducted in all nine provinces.

The data collection technique used was face-to-face pen and paper interviews due to the length of the instrument. In this technique, data is recorded on paper questionnaires and subsequently captured into a database. The data was collected cross-sectionally between December 2018 and April 2019.

3.4 Disengaged Response Bias

The detection of disengaged responses, that is, outlying responses which are probably guesses or are answered rapidly, affects the validity of any study. A disengaged response bias analysis using the Mahalanobis distance approach was applied to remove such disengaged responses before decision tree analyses were performed. See Appendix A for the full report.

3.5 Tests for Normality

The non-normality of the data was not a challenge given that the central limit theorem stipulates that the non-normality of the data does not significantly affect the results for sample sizes exceeding 167 (Field 2013). The normality test was only conducted for the Free State which had a sample size of 150; thus, normality was not violated.

3.6 Data Collection

The data was collected by a team of data collectors who were first briefed and trained on data collection (Althubaiti 2016; Fadnes, Taube and Tylleskär 2009). The questions were updated after feedback from the data collectors after the pilot study. Each of the data collection teams was monitored by a research administrator to ensure that the data was actually collected as required. The random sampling method used in selecting participants also served to reduce any bias in the data collection.

Table 9: Questionnaire sample breakdown

Province	Municipality	Area	Setting	Count
Eastern Cape	Nelson Mandela Bay	KwaZakhele	Township	25
		Port Elizabeth	Urban	100
	Sundays River Valley	Kirkwood	Rural	125
Free State	Mangaung	Bloemfontein	Urban	150
		Thaba Nchu	Peri-urban	50
	Manstopa	Botshabelo	Township	50
Gauteng	City of Johannesburg	Alexandra	Township	100
		Bramley	Urban	40
		Johannesburg	Urban	310
	Sedibeng	Orange Farm	Township	49
KwaZulu-Natal	eMondlo	eMondlo	Rural	250
	eThekhwini	Durban	Urban	150
		Umlazi	Township	100
Limpopo	Capricorn	Polokwane	Urban	51
	Makhado	Tshakhuma	Rural	174
	Thulamela	Thohoyandou	Peri-urban	25
Mpumalanga	Mbombela	Kanyamazane	Township	125
		Nelspruit	Urban	100
		White River	Peri-urban	25
Northern Cape	Ga-Segonyana	Barkly West	Rural	25
	Sol-Plaatjie	Galeshewe	Township	50
		Kimberley	Urban	175
North West	Greater Taung	Taung	Rural	150
	Madibeng	Hartebeespoort	Peri-urban	25
	Rustenburg	Rustenburg	Urban	76
Western Cape	City of Cape Town	Cape Town	Urban	350
		Khayelitsha	Township	50
	Drakenstein	Paarl	Rural	100

3.7 Statistical Data Analysis

The data collected was analysed statistically, and inferential analysis methods were used including: Chi square, Confirmatory Factor Analysis, ANOVA, Regression Analysis, Logistic Regression and Decision Tree Analysis (see Appendix A, B and C). The statistical p-value of 0.05 was used.

Chapter 4: Demographics

This chapter sets out a demographic breakdown of the questionnaire respondents. The questionnaire responses totalled 3000, almost evenly split between males (1499) and females (1501).

4.1 Age

The age categories used were adopted from Madsen, Daumerie and Hardee (2010), who demonstrated the effect of age structure on social and economic development. As seen in Figure 1, the majority of the respondents who answered this question are youth, viz: 18–35 (64.43%). This is a considerable over-representation as the youth nationally account for only some 36.2% of the population (Stats SA 2019b). The youth who are in the prime of their careers form the productive share of any population and are the focus of the current study.

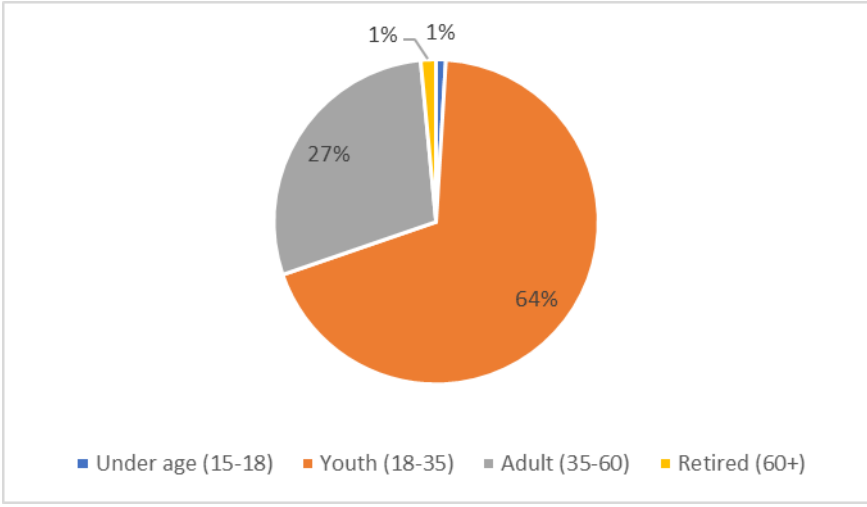


Figure 1: Respondents by age group (*Source:* Survey data)

4.2 Racial Category

The majority of the respondents (81%) are Black, while a further 14% are Coloured. This suggests a somewhat skewed representation of minorities within the sample. Statistics South Africa (Stats SA 2019b, vi) estimates the country's racial breakdown to comprise: Black (81%), Coloured (9%), White (8%), and Indian/Asian (3%).

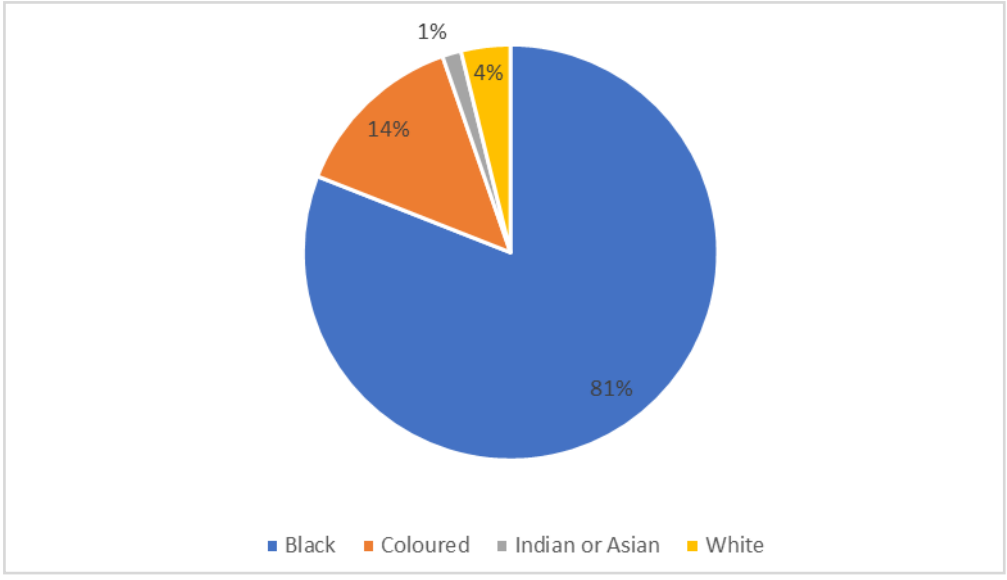
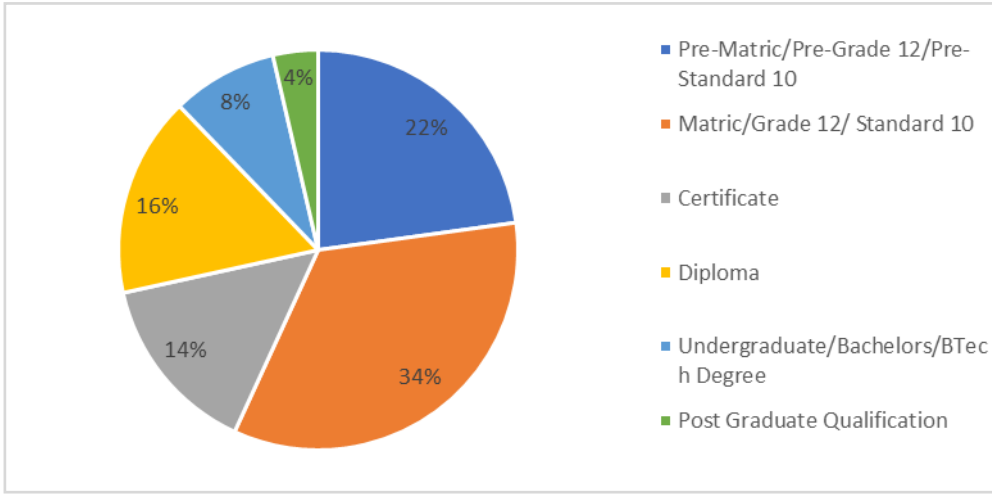


Figure 2: Breakdown of respondents by racial category (*Source:* Survey data)

4.3 Educational Attainment

Less than half of the respondents (44%) have some form of tertiary qualification, with only 12% holding university degrees. Nearly a quarter of the respondents (22%) have not successfully completed high school, although a number of these may be too young to have done so (7% of the sample are aged 20 or less).

Figure 3: Breakdown of respondents by educational attainment



As the graph in Figure 4 shows, the majority of the respondents have not progressed beyond matric: peri-urban areas (60.8%); rural areas (59.5%); townships (67.6%); and urban areas (51.5%). This suggests that post-matric career pathways for digital skills alongside other sector specialisations will need to be created. These pathways will enable a progression into an area of specialisation with the required digital skills.

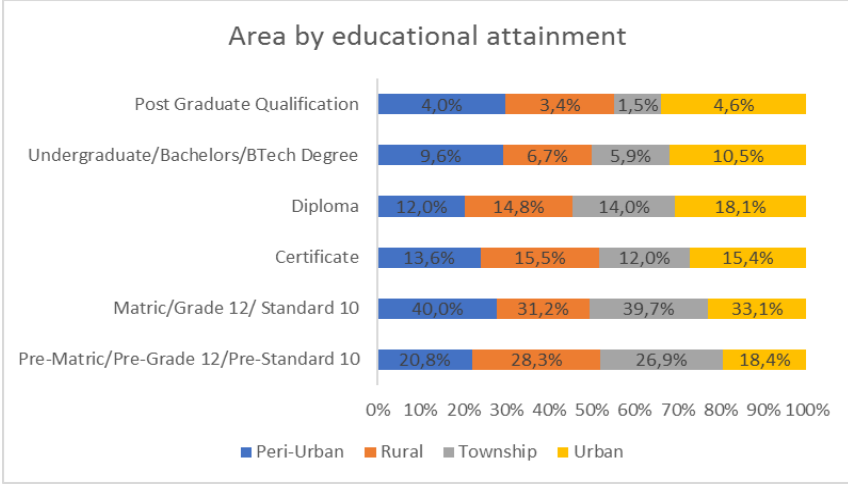


Figure 4: Breakdown of educational attainment by area (*Source:* Survey data)

Recent economic data suggests a growing demand for high-skilled workers, with low-skilled workers becoming increasingly contingent and under threat of job losses (OECD 2019). This is exacerbated by the growing prominence of digital

technologies in the economy (NEDLAC 2019; WEF 2018). The educational attainment profile identified above is, therefore, cause for concern in the context of a modern economy with the changes to be wrought by the 4IR looming. It seems likely, therefore, that a more strenuous educational intervention to increase digital skills alongside other skills is required.

4.4 Employment Status and Sources of Income

As can be seen from the pie chart in Figure 5, the level of unemployed (including those unable to work) across the sample stands at 27.7%, a level similar to that recently reported by Statistics South Africa (Stats SA 2019b), with students comprising a further 12.6%. Although unemployment and part-time employment are slightly more prevalent in rural areas, the differences in employment status by area are marginal. The average time being unemployed is 25 months.

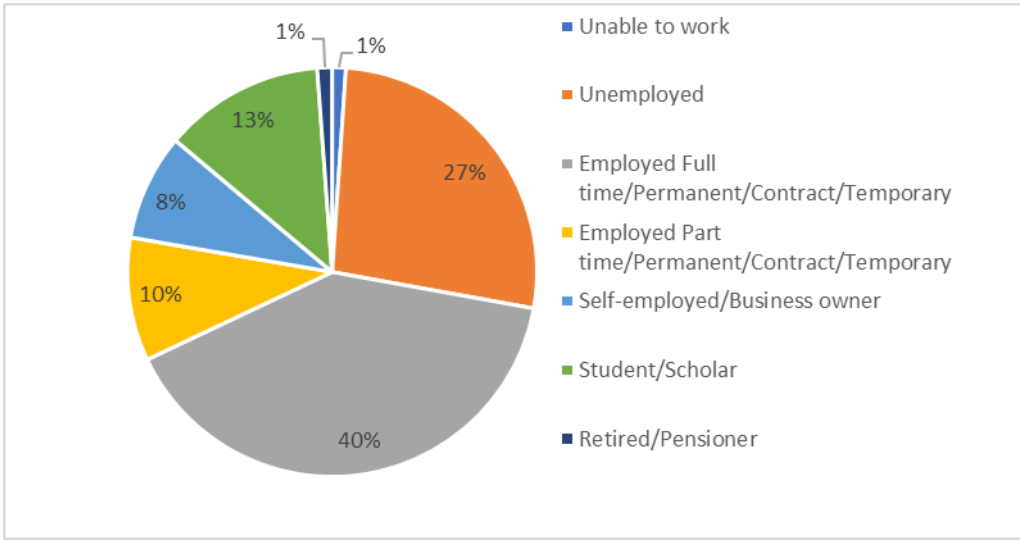


Figure 5: Breakdown of respondents by employment status (*Source:* Survey data)

The average number of dependents is 2. As far as sources of income go, 49.8% receive a salary, and a further 9.5% receive their income from business. However, 11.1% depend on social grants, and 25.7% have no income at all.

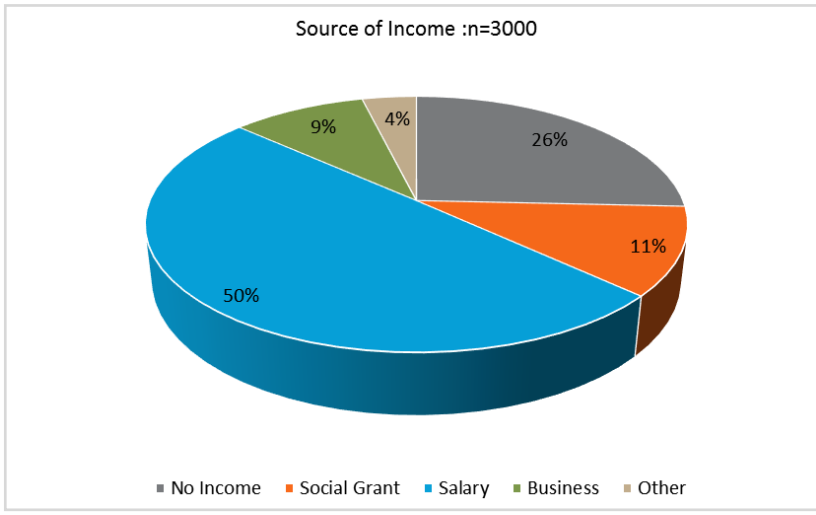


Figure 6: Breakdown of respondents by source of income (*Source:* Survey data)

Respondents were further asked to specify their monthly income band, with options ranging from no income to more than R30 000 per month. While 16% declined to answer this question, the responses of those who did answer paint a worrying picture, with well over half the respondents (61%) reporting monthly earnings of R5000 or less (see Figure 7).

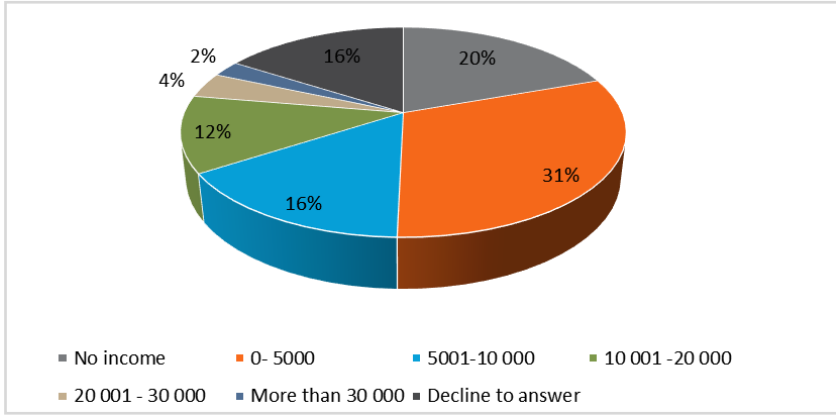


Figure 7: Breakdown of respondents by reported monthly income (*Source:* Survey data)

The data also reveals a stark income gap between urban and rural areas. Rural and township respondents (45.6%) make up 49.6% of those with no income, and 56.2% of those earning less than R5000 a month, while urban respondents (50.1%) make up 77% of those earning more than R30 000 a month.

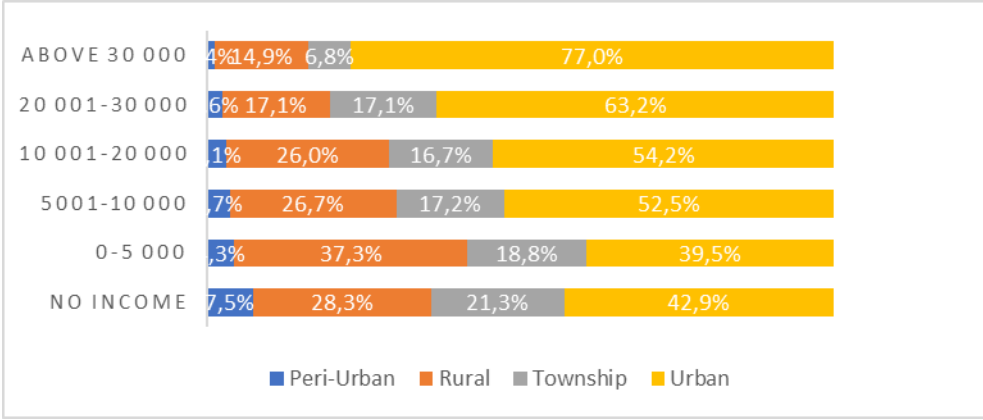


Figure 8: Breakdown of reported monthly income by area (*Source:* Survey data)

Those without post-matric education, and therefore with the lowest levels of academic skills, are likely to earn the least.

Table 10: Income vs educational attainment of respondents

Educational attainment	No income	0–5000 (R)	5001–10 000 (R)	10 001–20 000 (R)	20 001–30 000 (R)	Above 30 000 (R)	Total
Pre-Matric / Pre-Grade 12 / Pre-Standard 10	29.4%	51.3%	12.8%	3.9%	1.6%	1.1%	100.0%
Matric / Grade 12 / Standard 10	25.4%	42.7%	18.6%	10.2%	1.8%	1.3%	100.0%
Certificate	24.0%	34.6%	24.0%	12.8%	2.5%	2.2%	100.0%
Diploma	16.7%	22.0%	23.4%	25.4%	7.4%	5.0%	100.0%
Undergraduate / Bachelors / BTech Degree	11.8%	15.1%	18.9%	29.7%	17.5%	7.1%	100.0%
Postgraduate Qualification	11.1%	12.2%	10.0%	34.4%	17.8%	14.4%	100.0%

It also shows a worrying picture of a paradox of individuals with high levels of skills, yet without employment or income (11.1%). This phenomenon has been reported recently in the Eastern Cape as well by the Eastern Cape Socio Economic Consultative Council (ECSECC). Of those with a postgraduate education within the sample, 9.3% are unemployed, whilst they are also the highest paid education level.

Chapter 5: Digital Factors by Population Settlement and Province

5.1 Digital Factors by Population Settlement

There are a number of significant differences between the digital behaviours in urban, peri-urban, township and rural areas (see Appendix B).

5.1.1 Digital Factors in Peri-urban Areas

- In peri-urban areas, the use of MMS[9] is the strongest digital factor of income. Those who use MMS are more likely to earn [R5001–R10 000] (50% of those who use MMS) while those who do not use MMS are most likely to be those with no income (58.7% of those who do not use MMS).
- 71.2% perceive digital social exclusion. However, access to the internet at home is the strongest factor of this perception of social inclusion. Those without internet access at home tend to have a higher perception of social exclusion (84.2% of those in rural areas without access at home). Similarly, 82.4% perceive digital economic exclusion. Those without a laptop, have a higher perception of digital economic exclusion (90.4%). These findings support the rollout of devices and broadband in peri-urban areas as a means of digital social and economic inclusion.

5.1.2 Digital Factors in Rural Areas

- In rural areas, 55.5% perceive digital social exclusion. The strongest factor of digital social inclusion is first language; specifically, those who speak Sesotho, Sepedi and Tshivenda (88.1%), and Setswana (76.2%).
- 48.5% of those who speak Afrikaans, English and IsiNdebele experience digital social exclusion. 32% of those who speak IsiXhosa, IsiZulu and Xitsonga perceive digital social exclusion. However, 80% of those speak IsiXhosa, IsiZulu and Xitsonga and use WhatsApp perceive digital social exclusion. This calls for digital skills to translate digital content into local languages especially for the benefit of those in rural areas.
- The majority of those who are employed earn [R5001–R10 000]. Those who do not have any personal income and do not use the internet for entertainment (76.1% of those who do not use entertainment) are most more likely to be unemployed, compared with those who also have no income but who use the internet for entertainment (50% who use the internet for entertainment).

[9] MMS means multimedia messaging, i.e. sending SMS messages that have more than text, such as video or sound.

- 79.2% perceive digital economic exclusion. However, 43.5% of those in rural areas who use the internet to search for business opportunities perceive digital economic inclusion, while 87.5% of those who do not use the internet to search for business opportunities perceive digital economic exclusion. The strongest factor of digital economic exclusion among those who do not use the internet to search for business opportunities is a high self-efficacy (a belief in oneself to accomplish tasks). This finding supports digital literacy efforts in rural areas especially in terms of using the internet for business opportunities.

5.1.3 Digital Factors in Township Areas

- In township areas, 57.8% are employed; 94.7% of those who earn [R5001–R10 000] and who use online banking are most likely to be employed, compared with those who earn same amount but who do not use online banking (79.1%). Using the internet for entertainment is a strong factor of unemployment in township areas.
- The use of WhatsApp is a strong factor of digital social inclusion: 60.5% of those who use WhatsApp perceive digital social inclusion, compared with 23.9% of those who do not use it.
- The use of online banking is the strongest factor of digital economic inclusion: 81.5% of those who do not use online banking perceive digital economic exclusion, compared with 49.2% of those who use it. First language, especially those who speak Sesotho, Sepedi, IsiZulu, Xitsonga and English are the strongest factors of those who use online banking and perceive digital economic inclusion (72.1%).

5.1.4 Digital Factors in Urban Areas

In urban areas:

- Those who do not use online banking but who have personal email accounts are most likely to have no income (68%), compared with those who do not have personal email accounts (58.3%).
- Those who are unemployed and who spend less than R100 on mobile data per month are most likely to have no income (61%), compared with those who spend above R100 on mobile data per month (42.9%). Those who spend less than R100 on mobile data per month and who use the internet for entertainment are most likely to have no income (70.9%), compared with those who also spend less than R100 on mobile data per month, but who do not use the internet for entertainment (48.6%).
- 51.1% perceive digital social exclusion. However, 73.2% of those who participate in online forums to collaborate and make decisions, but do not keep in touch with others, perceive the highest digital social inclusion. It

is those who do not participate in online forums to collaborate, nor use the internet to search for business opportunities, but do not keep in touch with others, who experience the greatest digital social exclusion (75.6%).

- 69.2% perceive digital economic exclusion. However, 83.9% of those who use the internet to complete online training courses, and participate in online forums for business, and pay their bills online, perceive digital economic inclusion. This is the highest perception of digital economic inclusion. The lowest is 89%, that is, those in urban areas who do not use the internet to search for business opportunities, nor do they participate in online forums to exchange information, and do not pay their bills online.

5.2 Digital Factors by Province

There are a number of significant differences in the digital behaviours between provinces (see Appendix A).

5.2.1 Eastern Cape

In the Eastern Cape:

- The dominant personal income range is [R5001–R10 000] (64%) followed by no income. There is a slight difference between the digital factor of having a personal email account (85.9%) and not having one (86.5%) for the income range [R5001–R10 000]; as well as having an email account and using the internet to search for jobs. However, 78.2% of those who do not search for jobs online but have an email account also earn [R5001–R10 000], compared with those who have an email account and search for jobs online (88%).
- 79.7% are employed; 82% of those who search for jobs online and have a household income above R5001 are employed, compared with 96.7% who do not search for jobs online and earn above R5001.
- 64.4% perceive digital social inclusion: 77.7% of those who use the internet to keep in touch with others perceive digital social inclusion, compared with 46.3% of those who do not keep in touch with others. Moreover, 90.8% of those who further participate in online forums to collaborate perceive digital social inclusion, compared with those who do not participate on online forums but keep in touch with others (64.6%).
- 58.2% perceive digital economic exclusion. Moreover, those who do not use the internet to search for business opportunities perceive a higher digital economic exclusion (71.8%), compared with those who search (34.9%). It is those who do not search for business opportunities online and also have a low general self-efficacy who experience the highest

digital economic exclusion (89%), compared with those with a higher general self-efficacy (53.6%).

5.2.2 Free State

In the Free State:

- 50.3% do not have any income with the strongest factor of income being the use of e-wallet and mobile money to move and transfer money.
- 60% perceive digital social exclusion with participation in YouTube being the strongest digital factor. Furthermore, 54.5% of those who use YouTube perceive digital social inclusion compared with 27.8% of those who do not use YouTube.
- 75.2% perceive digital economic exclusion. Those who also perceive digital social exclusion are more likely to perceive digital economic exclusion (93.1%) compared with those who perceive digital social inclusion (48.3%).

5.2.3 Gauteng

In Gauteng:

- 65.3% earn [R5001–R10 000] with the strongest factors of income in Gauteng being the level of education and the use of Cell C network.
- 86.5% of those who have a certificate, pre-matric, matric, postgraduate qualification and undergraduate degrees and use Cell C are most likely to earn [R5001–R10 000].
- 81.9% are employed with those who earn [R5001–R20 000] being the highest employed (94.3%), compared with other income ranges (28.1%). Moreover, those in the [R5001–R20 000] income range who have internet access at home are the highest employed (96.3%), compared with those with the same income range but without internet access at home (83.9%).
- Different from other provinces, 58.1% perceive digital social inclusion: 100% of those who use MMS, and keep in touch with others, and perceive digital economic inclusion are most likely to perceive digital social inclusion as well compared with the same but who do not use MMS (88.5%).
- The highest perception of digital social exclusion are those who do not use MMS, spend more than R50 on monthly mobile data, and perceive digital economic exclusion (85.3%). Whereas, 59.6% of those who only spend less than R50 on mobile data per month but experience digital economic exclusion perceive digital social inclusion.

- 53.1% perceive digital economic exclusion: however, 95.4% of those who spend more than R150 on mobile data, and participate in online forums to make decisions and also perceive digital social inclusion, experience the highest digital economic inclusion. Further, 96% of those who do not bank online and perceive digital social exclusion also perceive digital economic exclusion, compared with 76.7% of the same but who bank online.

5.2.4 KwaZulu-Natal

In KwaZulu-Natal:

- 41.5% earn [R5001–R10 000], followed by those with no income (24.9%), and those earning [R0–R5000] (22.3%).
- 94.2% of those who are employed and who use Facebook are most likely to earn [R5001–R10 000], compared with those who do not use Facebook (81.8%).
- 51.5% are employed; 97.5% of those who perceive that their degree is IT related, and earn [R5001–R20 000] are employed.
- 66.9% perceive digital social inclusion: the strongest digital factor is the use of WhatsApp. Of those who use WhatsApp, 72.5% perceive digital social inclusion. Particularly, 87.1% of those use WhatsApp and use the internet for business, and also live in either rural or peri-urban areas, perceive digital social inclusion the most. However, 70.1% of those who live in urban areas, use WhatsApp but do not use YouTube experience digital social inclusion, compared with those who use YouTube (52.4%).
- 67.5% perceive digital economic exclusion with the strongest digital factor being using online banking and using the internet to search for business opportunities. Specifically, 96.7% of those who do not use WhatsApp, and do not use the internet to search for business opportunities and do not use online banking, those perceive the highest digital economic exclusion.

5.2.5 Limpopo

In Limpopo:

- 61.1% of the respondents earn [R5001–R10 000] with the strongest digital factor of income being the use of retail stores such as Shoprite/Checkers to transfer money.
- 75.2% perceive digital social exclusion with the strongest digital factor being participation in online forums to negotiate: 88.3% of those who use online forums to negotiate perceive digital social exclusion, compared with 63.4% who do not negotiate using online forums. However, 49.2% of

those who do not negotiate using online forums but use e-wallet and mobile money to move money, perceive digital social inclusion.

- 89.7% perceive digital economic exclusion; moreover, 95.5% of those who perceive digital social exclusion also perceive digital economic exclusion. These are very high figures and call for important further investigation.

5.2.6 Mpumalanga

In Mpumalanga:

- The most common income is [R5001–R10 000] (44.8%), followed by those without any income (36.4%). There are no digital factors of income in Limpopo.
- 25.9% are unemployed with the strongest digital factor being online banking. Those who earn [R5001–R20 000] and use online banking are also most likely to be employed (92.6%), compared with those with the same level of income but who do not use online banking (76.3%).
- 56.5% experience digital social exclusion; moreover, the strongest digital factors of this social exclusion are the use of online forums to negotiate and to interact with friends and family. Moreover, those who use online forums to interact with family/friends (53.2%) are most likely to feel socially included, compared with those who do not use online platforms to interact with family/friends (25.3%). Those who use the internet to both negotiate and interact with friends/family are even more likely to feel socially included (69.2%), compared with those who do not use the internet to negotiate (45.2%).
- 79.9% experience digital economic exclusion with the primary digital factor of digital economic exclusion being the use of Skype. Further, 50.9% of those who use the internet to Skype are most likely to experience digital economic inclusion, compared with those who do not Skype and feel digital included (11.3%). Those who do not Skype and also experience digital social exclusion are most likely to also experience digital economic exclusion (95.2%), compared with those who do not Skype but experience digital social inclusion (80.5%).

5.2.7 Northern Cape

In the Northern Cape:

- 40.5% of the respondents report having no income, followed by those with an income of [R5001–R10 000] (30.6%). There are no significant digital factors of income.

- In terms of employment, 43.4% are unemployed with only 35.5% being employed. There are no digital factors of employment in the Northern Cape.
- 51.7% experience digital social exclusion with the strongest digital factors of social inclusion being the use of the internet for entertainment and moving money using retail stores such as Shoprite/Checkers. Moreover, 62.6% of those who use the internet for entertainment are most likely to experience digital social inclusion, compared with those who do not use the internet for entertainment (23%). Those who use the internet for entertainment and who use retail stores such as Shoprite/Checkers to transfer money are even more likely to feel socially included (75.5%), compared with those who use the internet for entertainment but do not transfer money via Shoprite/Checkers (37.7%).
- 83.5% experience digital economic exclusion with the strongest digital factors being digital social exclusion, usage of online banking, and using the internet to keep in touch with others. Those who experience digital social exclusion are also most likely to experience digital economic exclusion (93.6%), compared with those who experience digital social inclusion (72.6%). Even further, those who experience digital social exclusion and do not use the internet to keep in touch with others are even more likely to experience digital economic exclusion (98.6%), compared with those who experience digital social exclusion but the internet to keep in touch with others (86.3%). On the other hand, those who experience digital social inclusion and use online banking experience digital economic inclusion (42.4%), compared with those who experience digital social inclusion but do not use online banking (12.1%).

5.2.8 North West

In North West:

- The most common income is [R5001–R10 000] (53.3%). The strongest digital factors of income are participation in online forums for business and having a personal email account. 85.5% of those who are employed and do not use the internet for business earn [R5001–R10 000], compared with 60.4% of those who are employed and use the internet for business.
- 78.5% experience digital social exclusion with the strongest digital factors being using the internet for online banking and to keep in touch with others, and participating in online forums to keep in touch with the family. who use the internet to keep in touch with others (39.1%) are most likely to feel socially included, compared with those who do not use the internet to keep in touch with other (7.4%). Those who use the internet to keep in touch with others and who use online banking are also

more likely to feel socially included (50.0%), compared with those who use the internet to keep in touch with others but do not use online banking (26.0%). Those who do not use the internet to keep in touch with others and who do not use online platforms to socially interact with family/friends are more likely to experience digital social exclusion (98.5%), compared with those who do not use the internet to keep in touch with others but use online platforms to socially interact with family/friends (87%).

- 84.6% experience digital economic exclusion with the strongest digital factors being digital social inclusion, the use of online banking and the use of Facebook. 92.7% of those who experience digital social exclusion also experience digital economic exclusion. 97.9% of those who experience digital social exclusion and do not use online banking are most likely to experience digital economic exclusion as well, compared with those who experience digital social exclusion but use online banking (78.0%). Moreover, 100% of those who have a Facebook account but do not bank online and experience digital social exclusion experience digital economic exclusion.

5.2.9 Western Cape

In the Western Cape:

- The most common income is [R5001–R10 000] (54.1%) followed by no income (28%). The strongest digital factors of income are having a personal email account and being on Instagram. Moreover, 93.8% of those who are employed and who have an email address are more likely to earn [R5001–R10 000], compared with those with no email account (66.1%). Those who have an email address and are on Instagram (95.7%) are more likely to earn [R5001–R10 000], compared with those who have an email address but do not use Instagram (92.1%).
- 62.7% are employed, with 19.2% being employed. The strongest digital factors of employment are online banking and using online platforms to participate in business. Those who earn [R5001–R10 000] and who use online banking are more likely to be employed (97.0%), compared with those with the same level of income but do not use online banking (88%). In addition, those who use online platforms to participate in business are more likely to be employed (99.1%), compared with those who do not online platforms to participate in business (92.3%).
- 52.9% report experiencing digital social exclusion with the strongest digital predicators being using the internet to pay bills, using YouTube and digital economic exclusion. Moreover 76.5% of those who experience digital social inclusion also experience digital economic inclusion.

- 70.6% of those who experience digital social exclusion are likely to be the ones who do not use the internet to pay their bills and also experience digital economic exclusion. Those who do not use YouTube, are even more likely to be the ones who experience digital social exclusion, while 45% of those who pay their bills online experience digital social inclusion despite experiencing digital economic exclusion.
- 75.2% perceive digital economic exclusion, while 96.2% of those who do not use Google+[10] and perceive digital social exclusion are also likely to perceive digital economic exclusion, compared with those who perceive digital social inclusion but use a Google account (80.2%).
- On the other hand, 75% of those who participate in online forums for business and experience digital social inclusion are very likely to experience digital economic inclusion compared with 33.1% who do not participate in online forums. Moreover, 78.7% of women who do not participate in online forums for business, yet experience digital social inclusion, are likely to experience digital economic exclusion, compared with 54.8% of men.

[10] Some clarification around Google+ is needed. As at the time of data collection, Google+ was already discontinued. We suppose that the respondents the question referred to the search engine.

Chapter 6: Other Aspects

6.1 Mobile Network Coverage and Costs

Of the mobile operators, Vodacom has the greatest number of users within the sample (43.3%), followed by MTN (38.8%), Cell C (23.8%) and Telkom (16.6%). This is not dramatically different from the current market share by SIM-card of the mobile licensees.

As can be seen from these percentages, there are a number of respondents using more than one network: 19.5% report using two cellular providers and 2% using three. This is dramatically lower than the figures estimated by the GSMA (2019, 3) (whose figures, albeit for Africa as a whole, imply that up to 60% of users have more than one SIM), but is very close to the 20% incidence of multiple SIM ownership recorded by Research ICT Africa (Onkokame Mothobi, personal correspondence, 28 August 2018). Data from ICASA's 2019 State of ICT report suggests that multiple SIM ownership is the norm rather than the exception.

The level of mobile data usage per month remains relatively low, with less than half of the respondents spending more than R100 per month (see Figure 9).

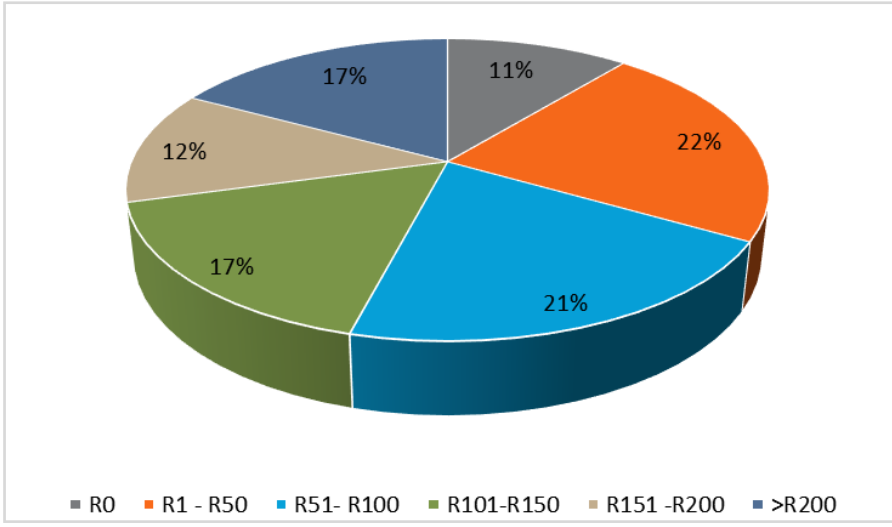


Figure 9: Breakdown of monthly mobile expenditure (*Source:* Survey data)

6.2 Digital Ownership

Without access to a digital device, access to the internet is impossible, and the acquisition of digital skills is severely hampered. The questionnaire accordingly assessed levels of ownership of digital technologies. This is arguably a key section

of the study, from which relationships with productive usage and skills deployment can be inferred.

Ownership of technologies amongst the sample is represented in the chart below. Smartphone ownership came in at a high 86.4%, followed by TV at 68.2%, with laptop ownership at a noteworthy 38.2%. This puts smartphone ownership within the sample well above the 60% reported by the Pew Research Center (2019), but in line with the 82% claimed by ICASA (2019, 55).

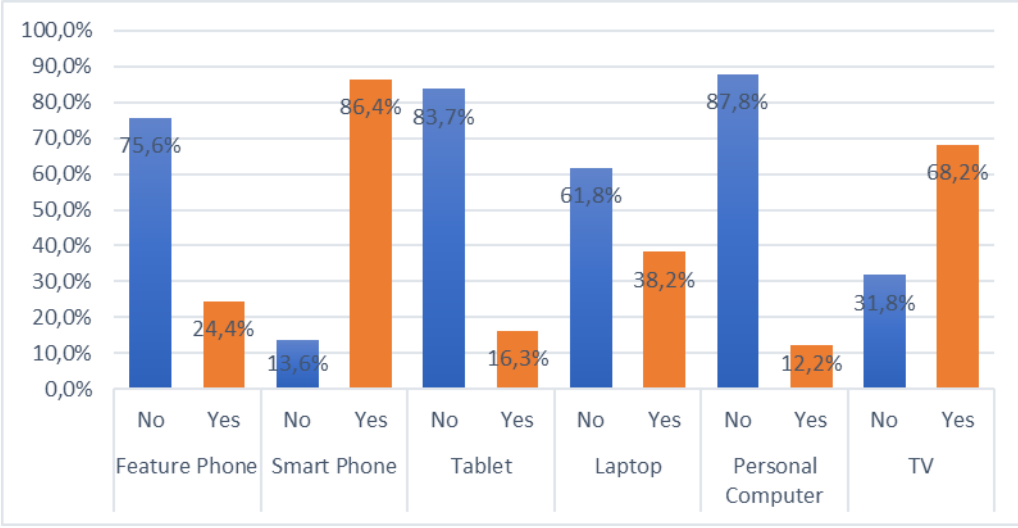


Figure 10: Digital technology ownership (*Source:* Survey data)

It is important to note that phones, tablets and PCs have mainly been bought in cash (75.1%), with far smaller numbers acquiring them on contract (11.0%) or receiving them as a gift (10.6%).

Because there was a thematic interest in understanding whether digital technologies could be used to support agricultural activities, land and home dwelling ownership were also measured. The results from the current sample were insufficient for any conclusions to be drawn. Whilst 58.6% own a house, only 28.8% own land.

Further, the overwhelming majority (89.2%) use their land for residential purposes. A very small number use their land for agriculture (5.1%) or commercial (2.6%) purposes, or own livestock (5.4%).

This does not mean that digital technologies and digital skilling have no role to play in agriculture. Rather, a separate, more specifically focused study will be required to investigate this.

6.3 Digital Access and Usage

This section seeks to understand the extent to which individuals have access to and adopt digital services and the associated capabilities that are derived from technology ownership.

Ability to access the internet is widespread within the sample, with 92.3% saying they know what the internet is and 67.2% reporting internet access from home. Similarly, 90.9% understand what WiFi is, and a substantial majority (72.2%) use WiFi access it regularly – mainly either always (23.9%), or often (28.7%).

A substantial majority of the respondents (58.8.2%) report having access to free internet. Free internet access occurs mainly from public spaces (31.6% of respondents), work (30.7%) and libraries (19.3%), as can be seen from Figure 11. The reasons for these were not explored in the survey, and may be related to affordability constraints. Nevertheless, it does suggest that investment in public WiFi appears to be yielding returns, and that users tend to some degree to congregate around free WiFi hotspots. Such hotspots can be turned into opportunities for learning and digital upskilling.

The least actively used digital device is the personal computer (used by only 29.1% of respondents), with 65.2% having never or rarely used one. Most (55%) have never used a feature phone.

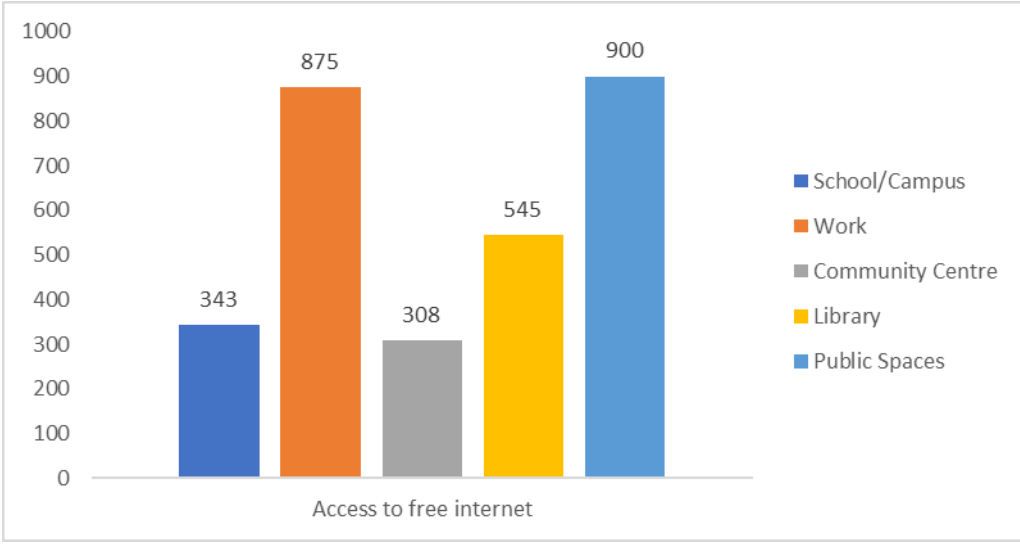


Figure 11: Access to free internet by location (*Source:* Survey data)

6.4 Digital Awareness and Digital Usage

The questions in this section of the survey sought to understand the extent to which individuals are aware of digital technologies, their capabilities and the way in which these capabilities are used. This is an important dimension for understanding productive usage of digital technologies and the associated capabilities.

6.5 Using Digital Services

Although the respondents report a wide range of areas for internet usage, five main areas stand out (as can be seen from Figure 12): search for information (69.3%), entertainment (61.5%), to keep in touch with others (49.8%), online banking (40.9%), and to search for business opportunities (32.3%).

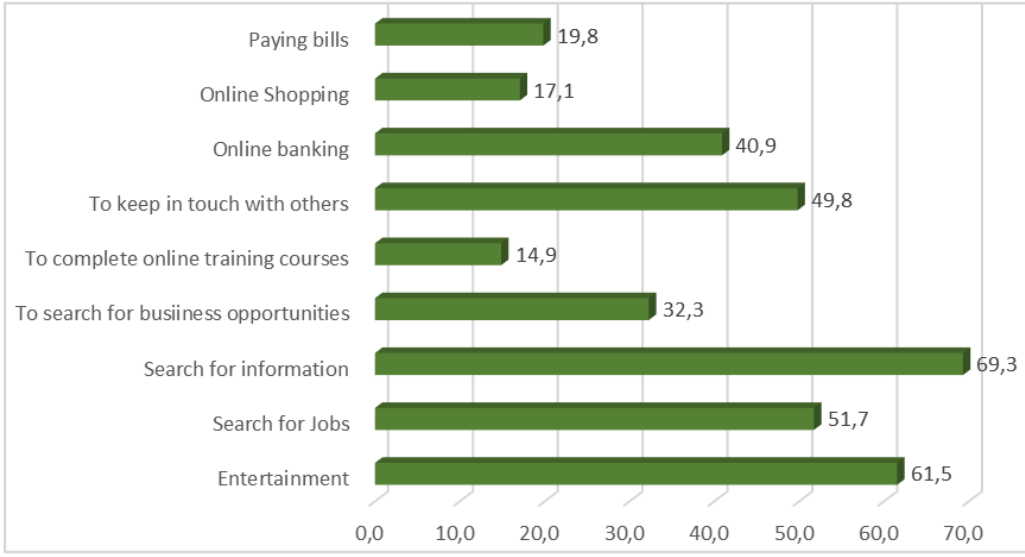


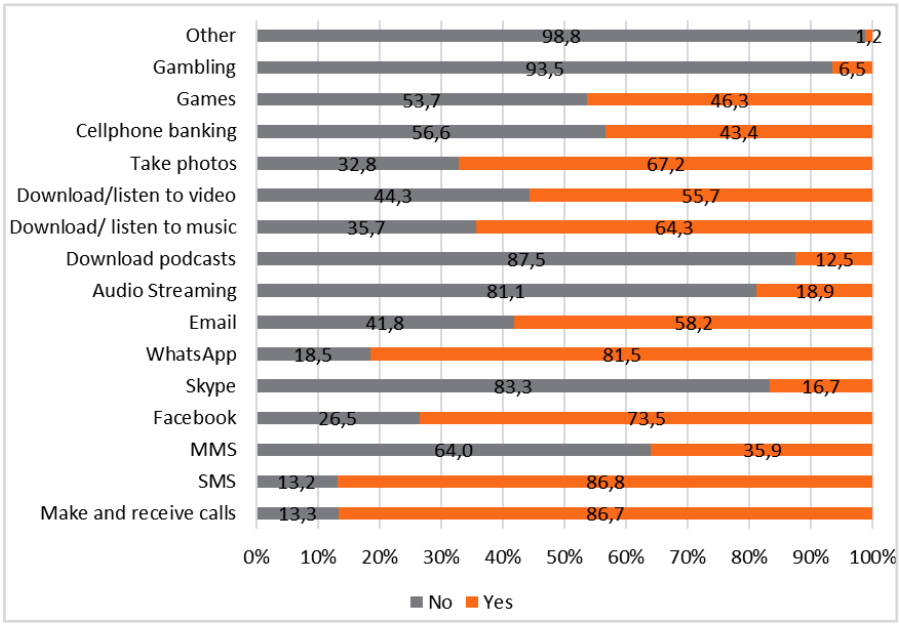
Figure 12: Services used on the internet (*Source:* Survey data)

It is noticeable that only 14.9% use the internet to complete online training courses. The low usage for learning purposes, an important aspect of digital upskilling, despite the fact that there is a great deal of free educational content online suggests an opportunity for e-learning interventions. Taken together with the respondents' penchant for entertainment, this may present opportunities for the provision of online content as "edutainment" – a concept called the "gamification of learning".

Whilst the respondents are overwhelmingly confident with using a laptop or computer (82.8%), a substantial number (17.2%) are not computer-literate.

Computer-literacy is mainly self-taught (54.5%), with a further significant number having attended a course (33.3%).

The usage of computers, laptops and mobile phones by participants who own them is set out in the graph in Figure 13, with communications – SMS (86.8%), make and receive calls (86.7%), WhatsApp (81.5%) – predominating. More entertainment-style applications such as the social media platform Facebook (73.5%), taking photographs (67.2%), and downloading and listening to music



(64.3%), also feature prominently.

Figure 13: Usage of computers and mobile phones (*Source:* Survey data)

6.6 Online Banking

Online banking is an internet service that requires a certain level of digital skills, and was, accordingly, covered in the questionnaire. Of the respondents, 83.8% said they were aware of online banking, but only 55.7% actually use it. Most transfer money through a variety of channels, with the services offered by large retail stores such as Shoprite/Checkers and others being the most popular (62.8%), followed by the use of e-wallet/mobile money (47.0%), and online banking services (46.5%).

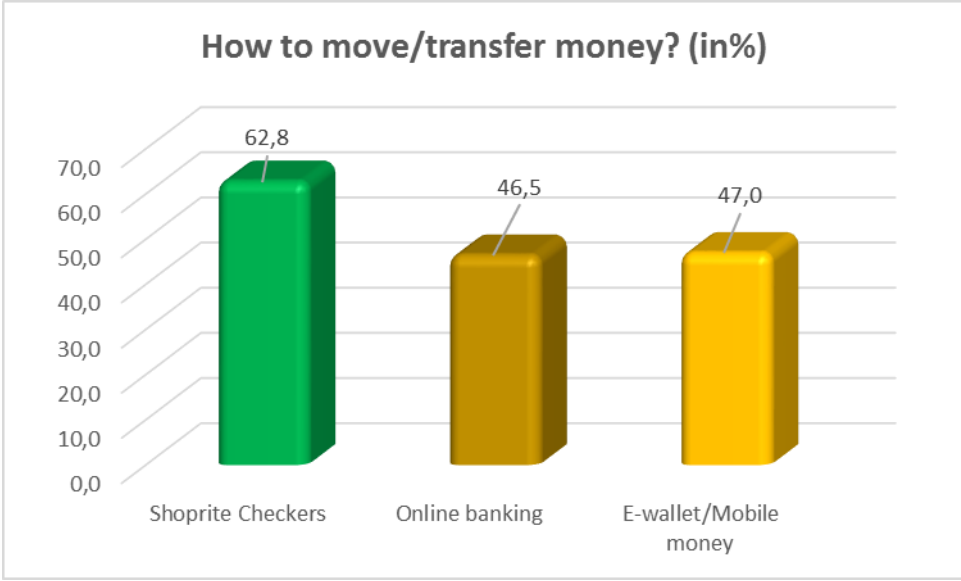


Figure 14: Usage of money transfer services (*Source:* Survey data)

Interestingly, members of stokvels or co-operatives make very limited use of the internet to conduct their financial activities, with only 10% doing so.

6.7 Digital Benefits

The survey also focused on the benefits that the individuals identified they derive from using the digital devices they possess. It has been shown at the macro level that investments in digital infrastructure contribute to GDP growth, direct job creation, business innovation, competitiveness, promotion of foreign direct investment, productivity gains and the creation of new industry clusters, services and products (ITU 2018). The benefits at the micro or individual level are similarly in need of examination.

The standout benefit perceived by respondents from using computers or mobile phones was access to information, which was listed by 72.2%.[11] This was followed by social inclusion (47.8%) and preparing for (34.2%) and finding (44.9%) employment. It is worth noting that only 27.6% see their digital devices as offering a way to feel more included in the economy.

[11] Note that respondents were given a restricted set of options, which did not include telephony or messaging.

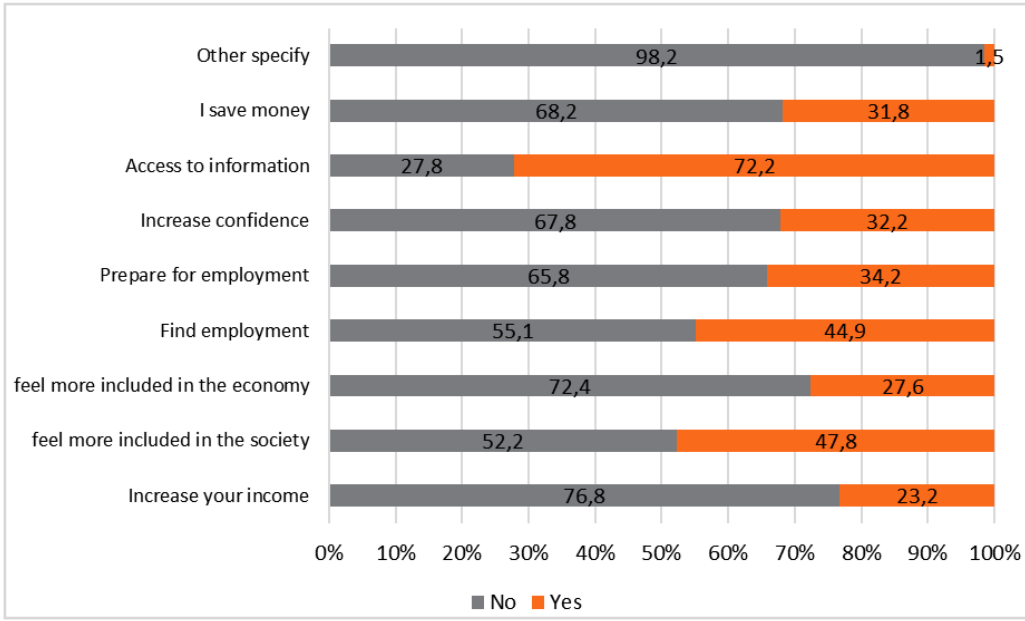


Figure 15: Benefits of computers/mobile phones (*Source:* Survey data)

There are some divergences when the data is disaggregated (see Appendix C). Those living in peri-urban areas are more likely to list finding employment a benefit than those in rural or urban areas. The age groups from 21–40 actively use their devices to seek employment. It was surprising to find that only 49.2% of the unemployed see finding employment as a benefit of their digital devices.

6.8 21st Century Skills

As noted in the discussion on the methodology at the outset, individuals today need a complex variety of skills in order to live and work in a 21st century digital era. The notion of e-skills or 21st century skills focuses on a broad range of non-technical abilities required to be able to use digital resources effectively. In terms of the model adopted (Van Laar, Van Deursen, Van Dijk and Haan 2017), such 21st century skills are defined as falling into the following five categories:

- Information and data literacy (ability to comprehend digital information)
- Communication and collaboration (connect and share in a digital environment)
- Digital content creation (create and edit content using digital artefacts)

- Online safety (protect information, ensure privacy and stay safe in the digital world)
- Problem solving (identify digital resources to solve and make decisions for problems and opportunities)

6.8.1 Information and Data Literacy

On average, 64.8% of the respondents are able to comprehend digital information. This is worrying as 35.2% of the respondents are unable to do so.

There is no significant difference when compared across population settlements. However, there is a considerable variation by age, with younger respondents (21–30) showing greater levels (70.4%) of data literacy, as opposed to those over 60 (25.3%).

6.8.2 Communication and Collaboration

On average, 72.6% are connecting and sharing in a digital environment with ease. Of the above, 76.9% are aware of the potential impact of their communication on social media, and 70.6% are sensitive about what they post.

The highest percentage of those who connect are between 21–30 years of age – whether in rural (74.3%) or urban (78.6%) areas. However, only 25.4% of those aged 60 and above who live in rural areas connect. Of the people that connect, only 55.8% connect for business purposes.

6.8.3 Digital Content Creation

The platforms most used for creating content are: WhatsApp (86.5%), Facebook (76.3%), YouTube (47.3%), Google+ (41.5%) and Instagram (34.4%). The youth [15–35) account for a disproportionate level (78.5%) of Instagram usage. Digital skills programmes targeted at this age group would, therefore, benefit from engaging with this platform.

6.8.4 Online Safety

In terms of online safety:

- 31.1% rarely or never back up their information and documents. This relates to online safety and hacking attacks as well as machine malfunctions.
- 73.1% say they understand the legal implications of using the internet. Of these, those over the age of 50 (51–60) constitute 49.5% of the group. Those over 60 constitute 44.1% of the people who understand the legal implications of using the internet.

- 65.8% say they are protecting their information and staying safe in the digital world.
- Online safety awareness is relatively consistent across the rural (64.3%), peri-urban (60.4%) and urban areas (68.4%).
- Those aged 60 and above are least worried about online safety (38.9%). This suggests that the elderly are more vulnerable to cybercrime, and could benefit from online safety interventions.
- 81.7% are wary about the financial risks, such as credit card fraud and identity theft.
- Almost half (49.2%) say they are offended by messages posted on social media, but this proportion declines with age, with only 23.3% of those aged 60 and above reporting that they are offended. It is unclear what this is related to: it would need to be investigated further.
- 75.6% do not feel safe with using the internet in public spaces, and 55.2% feel unsafe with the internet at work. As might be expected, the majority (74.6%) feel safe using the internet at home. Taken together with the fact that substantial numbers (31.6%) access the internet in public spaces, this suggests that online safety in public spaces needs to be improved significantly. This finding, however, requires more research.
- 12.6% have been victims of cybercrime or fraud.

6.8.5 Problem Solving

In response to questions on problem solving:

- On average, 54.7% believe they are able to identify digital resources to assist in solving problems and making decisions. However, there is a strong age group disparity in the responses, with belief in digital problem-solving ability tapering off dramatically with age to 44% in the 41–50 age group, 35.3% for those aged 51–60 and 22.8% for those aged 60 and over.
- 62.4% believe they easily adapt to technological changes.
- 46.6% find online courses and material useful, those aged 21–30 more so (51.9%) and those aged 31–40 less so (43.9%). This means there is a large number of young people who do not think that online courses and tutorials are useful. Combined with the fact that only 14.9% use the internet to complete courses online, this suggests both research and development needs to be done in this area.
- 49.2% say they consistently apply what they have learnt online, with a similar age profile: 60.2% of those aged 21–30 say so, compared to 20.9% of those aged 60 or above. Taken together this points to younger

respondents as more likely to be considered what are sometimes referred to as “digital natives”.

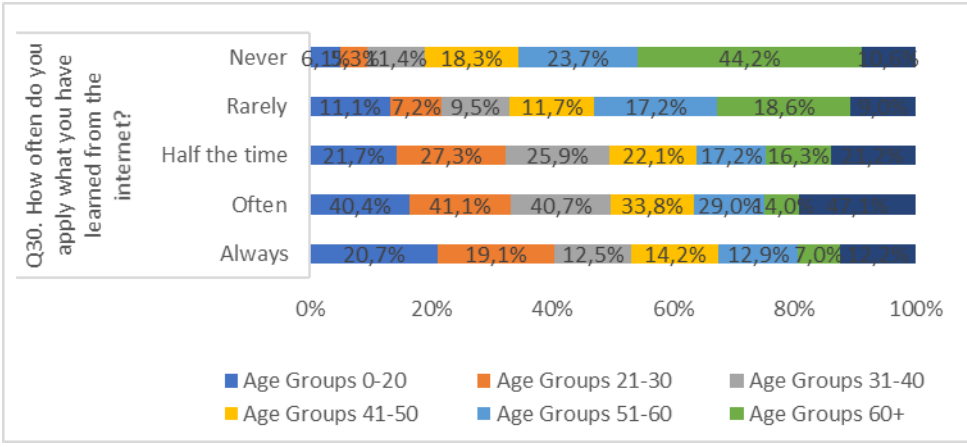


Figure 16: Applying learning by age group (*Source:* Survey data)

6.9 Awareness and Usage of Free Apps

Generally, the respondents are most aware of the following free applications or services:

- Email (65.4%)
- Video (62.6%)
- Presentations (49%)

The following free productivity applications are less known:

- Word processing (47.6%)
- Publishing (43.3%)
- Spreadsheets (43.1%)
- Mind maps (38.3%)
- Programming (37.9%)
- Project management (35.5%)

These results suggest that a lot more needs to be done around creating awareness of these free productivity applications and training on the skills needed to use them. Those who use free applications find them:

- Easy to use (51.3%)

- Cost effective (free) (56.4%)
- More functional (21.5%)

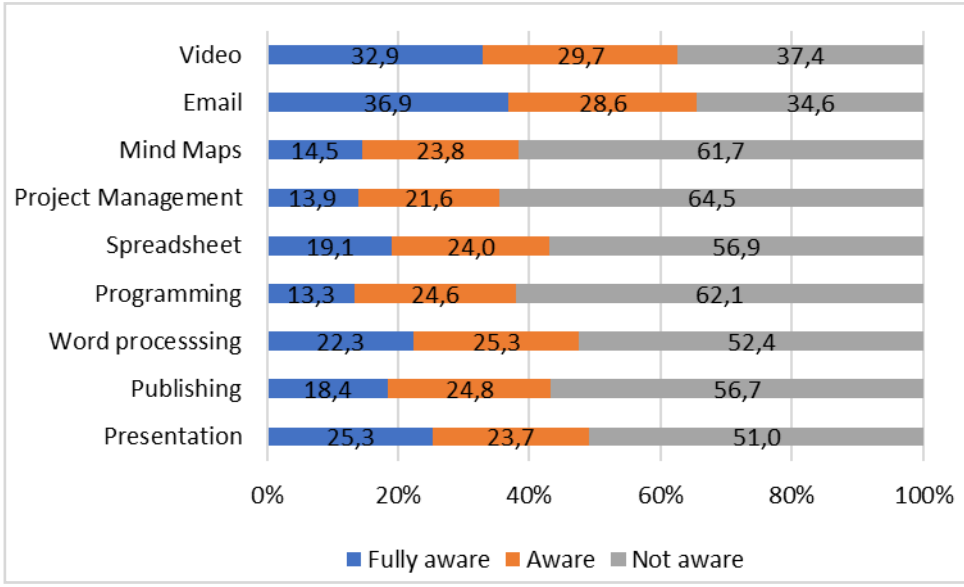


Figure 17: Awareness and usage of free apps

6.10 General Self-Efficacy and ICT Self-Efficacy

This part of the report covers those sections of the questionnaire dealing with self-efficacy in general and self-efficacy in respect of ICT.

6.10.1 General Self-Efficacy

Self-efficacy refers to an individual's judgement of their capabilities to organise and execute a course of action required to attain designated types of performances. Self-efficacy has the greatest influence on the choices of behaviour in answer to the question, "Can I do this?" The answer determines the choice of activities and environments, effort expenditure, persistence, thought patterns, and reactions when faced with obstacles. Self-efficacy has been used as a measure of career-related choices in ICT.

The combined scores of all the questions dealing with general self-efficacy show that overall 80.6% of the respondents judge themselves highly (agree or strongly agree) in respect of efficacy – as can be seen in the graph in Figure 18. The area with the highest rating was the ability to solve difficult problems by trying hard enough (86.1% either agree or strongly agree with the statement). The lowest rating was with respect to resourcefulness (74.8% either agree or strongly agree with the statement).

Disaggregation of the responses shows that unemployed and retired respondents have a slightly lower self-efficacy rating – at 75.5% and 74.3%, respectively (see Appendix C).

6.10.2 ICT Self-Efficacy

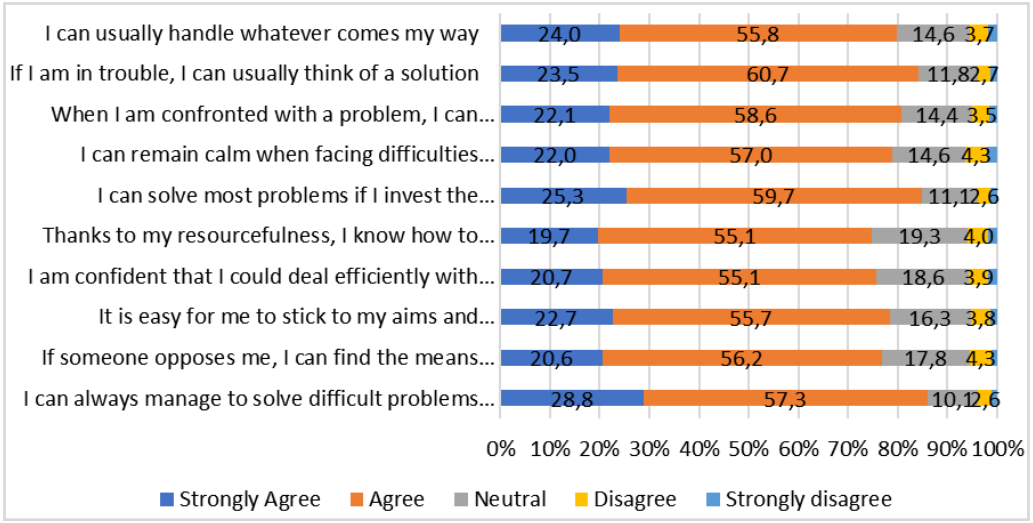


Figure 18: General Self-efficacy (*Source:* Survey data)

ICT self-efficacy is an adapted instrument based on general self-efficacy that measures an individual's ability to successfully complete tasks using ICT. ICT self-efficacy is important in an environment driven by digital artefacts. Individual perceptions towards digital technologies and patterns on digital usage are significant towards building digital citizenship.

When it comes to ICT self-efficacy, the scores are substantially lower than general self-efficacy, as can be seen from the graph below. Only 58.8% of the respondents believe they can complete tasks using ICT, regardless of gender or age group (with the exception of those aged 50 or above with much lower ICT self-efficacy). This means that substantial numbers (41.2%) are not confident in their ability to complete tasks using ICT. This is an important aspect to address in any digital skills intervention.

The employed and students have the highest ICT self-efficacy rating at 62.6% and 63% respectively. The unemployed have a lower ICT self-efficacy at 50.5%. Although the exact nature of the causality is unclear, this does imply that digital upskilling may have a role to play in assisting unemployed individuals to find jobs.

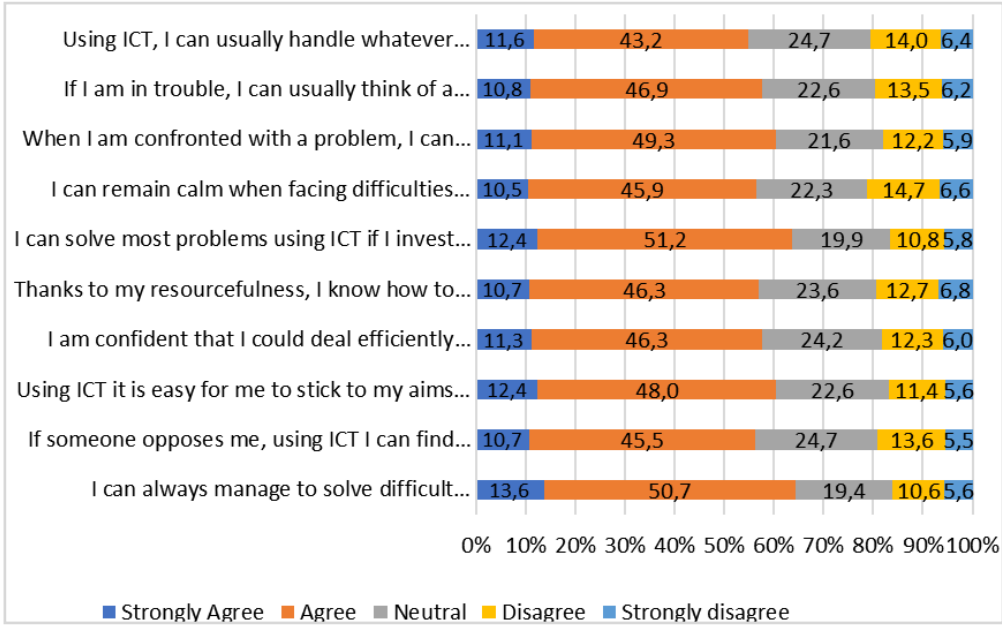


Figure 19: ICT self-efficacy (*Source:* Survey data)

6.11 Government to Citizen (G2C)

This section of the survey sought to examine the interaction between government and the respondents as enabled by digital technology in the form of digital government solutions. Digital government, as it relates to citizens, emphasises the ability of government and citizens to exchange information and to complete transactions in an efficient, digital manner. It also relates the digital provision of government services.

The respondents display a general lack of interest in government websites or applications, with under half (45.3%) reporting to have utilised either. Of those government websites visited, Education was listed most often (35.2% of the total sample), followed by Home Affairs (21.5%). No other government website scored above 20%. When digital government services are accessed, it is mainly to apply online for a government service (29.4%), to log a query (15.3%) or to pay for a service (12.8%). Further, 45.8% do not trust government websites, and 69.5% believe that government websites should be in their home language.

Less than a quarter (21.7%) make regular use of government accounts on social networking sites, with nearly two thirds (63.4%) rarely or never doing so. Nonetheless, there is a relatively high level of intermittent interaction with government on social media: 43.8% have followed or become a fan of a government official, 27.3% have posted comments on a government social media

page, 20.7% have read government blogs, and 8.3% have posted on government blogs.

Whilst the exact reasons for this low level of G2C interaction are unclear, it does indicate that the government interface to citizens using digital technologies needs considerable attention.

Government responsiveness is examined in Figure 20. Levels of dissatisfaction amongst the respondents are high, with 72.2% stating that they never or rarely successfully complete what they have tried to do on a government website. Similarly, 64.9% are either never or rarely satisfied with the responses from government officials or departments, while 69.8% indicate that government department or officials either never or rarely respond to communication on social networking sites.

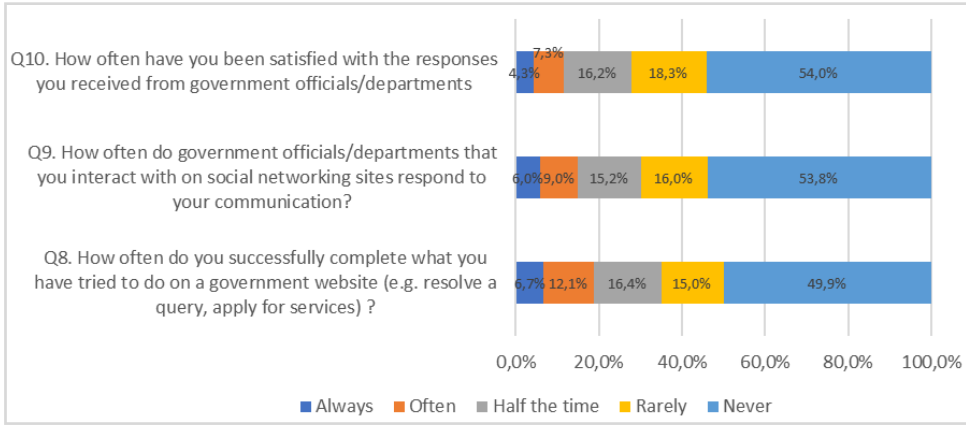


Figure 20: Digital government responsiveness

These poor levels of government responsiveness to citizens may well account for the low levels of usage of digital government services reported above, and indicate the need for a far more customer-centric approach in e-government service offerings.

6.12 Poverty and Social Inclusion

The World Economic Forum (WEF 2018) suggests that the adoption of digital technologies in lower income groups may increase income gains at the base of the economic pyramid. As part of the national drive to eliminate poverty and reduce inequality, questions related to poverty, unemployment and social inclusion were included in the questionnaire. Accordingly, the survey drew on the Multi-dimensional Poverty Index of Statistics South Africa (Stats SA 2014),

which incorporates a range of indicators to capture the complexity of poverty. The index shows that the lived experience of poverty is complex and multi-faceted, and includes poor health, lack of education, inadequate living standards, lack of income, disempowerment, lack of decent work, and threat from violence.

For health, the indicator considered was child mortality. With regard to education, the focus was on number of years of schooling completed and the number of children between the ages of 7–15 who are out school. The standard of living indicators spanned access to water, sanitation, type of dwelling, asset ownership, and access to fuel for the purposes of lighting, heating and cooking. For economic activity, the number of adults who are unemployed in a household was considered.

The respondents live in households with an average of 4.41 people, where the average monthly spend on food is R2 171,56. About 8.5% have experienced child mortality (death of a child under 5 years) in the past 12 months; and 60.1% have members in the household above the age of 15 who have completed at least 5 years of school. There are, however, 13.6% of school-age children (7–15 years) identified as being out of school.

Of the respondents, 87.4% have access to a radio, television or refrigerator in their household; 78.5% have access to a flush toilet; 57.5% do not have piped water in their houses; 51.9% have a car in the household; 25.6% do not use electricity but use paraffin, candles, wood, coal, or dung for fuel for either cooking, lighting or heating; and 22.9% of the households have unemployed adults in the home.

Table 11 presents data about poverty and social inclusion from Statistics South Africa (Stats SA 2019a).

Table 11: Statistics South Africa indicators

Statistics South Africa indicators	Data related to this
People per household	4.41 people
Average household spend per month on food	R2 171,56
Child mortality of under five years in the past 12 months	About 8.5% have experienced child mortality of under five years in the past 12 months
Members in the household above the age of 15 who have completed at least 5 years of school	60.1%
School going children (7–15 years) identified as being out of school	13.6%
Access to radio, television or refrigerators in the household	87.4%
Access to a flush toilet	78.5%
No piped water in their houses	57.5%

Car in the household	51.9%
Don't use electricity but use paraffin, candles, wood, coal, or dung for fuel for either cooking, lighting or heating	22–25.6%
Households with unemployed adults in the home	22.9%

These indicators provide the context when interpreting the findings on digital technologies in relation to poverty and social inclusion.

Conclusion and Recommendations

The study undertaken here started out with a broad range of questions, which were narrowed down before the survey was conducted.

On the basis of the outcomes reported here, further narrowing down and refinement needs to be undertaken to finalise a shorter but comprehensive set of questions which are worthy of further attention and for longitudinal investigation.

For example, the distinctions between digital ownership, digital access and digital awareness/usage appear to be more superficial than real, suggesting that these questions are better combined into a single section, with some re-sequencing.

There are a number of global indexes and reports that include digital skills as component factors. Comparison between the current survey and the issues covered in those reports needs to be undertaken for further validation of the survey instrument.

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Appendix A: Decision Tree Analyses (Provinces)

Introduction

This report presents the Mahalanobis and the decision tree analyses of each of the nine provinces in South Africa. The Mahalanobis test was used to identify response biases related to disengaged answers. The decision tree model was effective in determining the predictors (profile) of income, employment status, social inclusion and economic inclusion. The non-normality of the data was not an issue given that the central limit theorem stipulates that the non-normality the data does not significantly affect the results for sample sizes exceeding 167.[12] Therefore, the statistician only conducted a normality test for the Free State which had a sample size of 150; thus, normality was not violated.

1. Eastern Cape

1.1 Disengaged Response Bias

Table 1

Number	Questionnaire ID	MAH	p-value
1	2704	36.05721	.00
2	2714	20.32556	.00
3	2694	25.79087	.00
4	2663	57.64900	.00
5	2618	30.71739	.00
6	2587	39.80809	.00
7	2506	25.11735	.00
8	2523	21.82391	.00
9	2566	32.02994	.00

Table 1 indicates the respondents who can be a potential source of bias. According to the results, the responses of nine participants out of 225 deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving.

[12] Field, A. *Discovering Statistics Using IBM SPSS Statistics* (Thousand Oaks: Sage, 2013), 173.

Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

1.2 Decision Tree Analyses

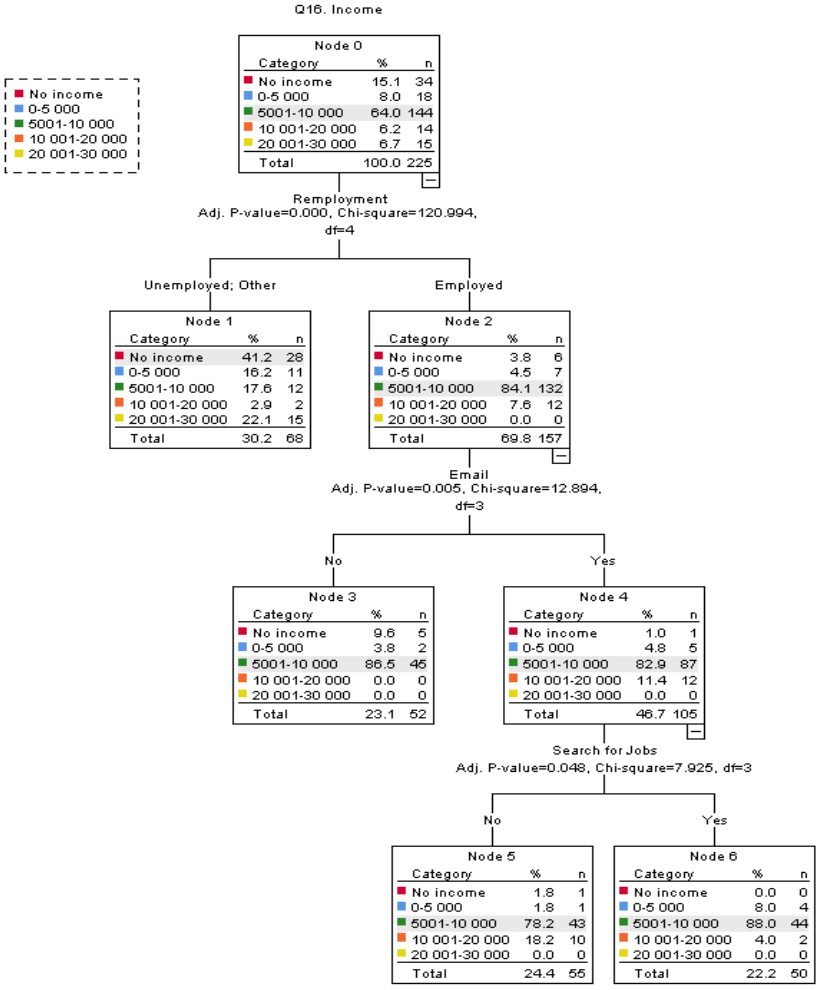

Figure 1: Decision tree of income

The decision tree of income (Figure 1) indicates that 64% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (15.1%). Respondents earning [R0–R5000] represent 8% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 6.2% and 6.7%, respectively, of the total sample. According to the tree, the strongest

predictor of income in the Eastern Cape is the employment status as it has the highest Chi-square (120.994) with the lowest p-value (.000). The results indicate that 157 out of 225 respondents (69.8%) are employed from which a large majority (84.1%) earn [R5001–R10 000]. Note that 82.9% of those who are employed and who have an email address earn [R5001–R10 000]. However, 86.5% of those who are employed with no personal email also happen to earn [R5001–R10 000]. Those who have an email address and use the internet to search for job (88%) are most likely to earn [R5001–R10 000], compared with those who have an email address but do not use the internet to search for job (78%). In conclusion, the dominant personal income range in the Eastern Cape is [R5001–R10 000]. The personal income level in this province is determined by three main factors, which are: employment status (1), having an email address (2) and using the internet to search for jobs (3).

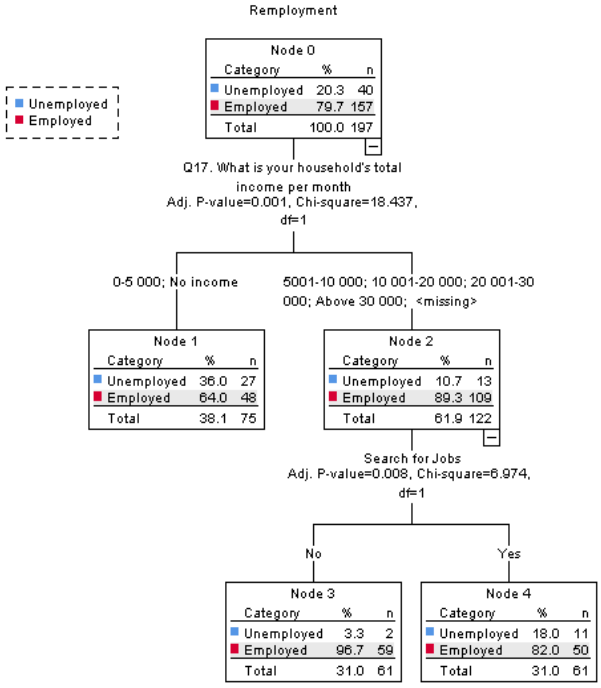

Figure 2: Decision tree of employment status

The decision tree of employment status (Figure 2) indicates that 79.7% of the respondents are employed in the Eastern Cape, that is, 157 out of 197 people. According to the tree, the strongest predictor of employment status in the Eastern Cape is the monthly income of the household because it has the highest Chi-square (18.437) with the lowest p-value (.001). The results indicate that

respondents with a household income of R5001 and above are most likely to be employed. Those who earn R5001 and above and who do not use the internet to search for jobs are also most likely to be employed (96.7%), compared with those with the same level of income who use the internet to search for jobs (82%). In conclusion, most respondents in the Eastern Cape were employed. Two factors were found to predict their employment status, namely: monthly household income (1) and using the internet to search for job (2).

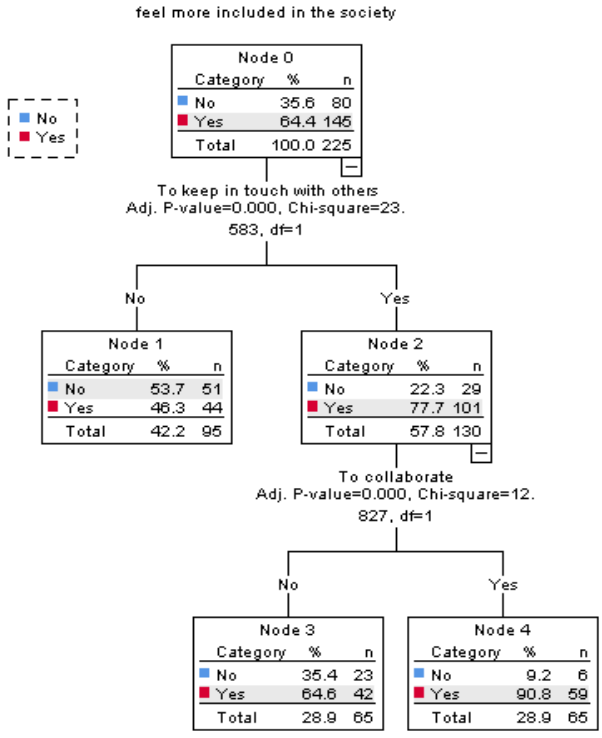

Figure 3: Decision tree of social inclusion

The decision tree of social inclusion (Figure 3) indicates that 64.4% of the respondents in the Eastern Cape feel socially included, that is, 145 out of 225 people. According to the tree, the strongest predictor of social inclusion in the Eastern Cape is using the internet to keep in touch with others because it has the highest Chi-square (23.583) with the lowest p-value (.000). The results indicate that respondents who use the internet to keep in touch with others (77.7%) are most likely to feel socially included, compared with those who do not use the internet to keep in touch with other (46.3%). Those who use the internet to keep in touch with others and who participate in online forums to collaborate are even more likely to feel socially included (90.8%), compared with those who use the

internet to keep in touch with others but do not participate in online forums to collaborate (64.6%). In conclusion, most respondents in the Eastern Cape feel included in the society. Two factors were found to predict their feeling of social inclusion, namely: using the internet to keep in touch with others (1) and participation in online forums to collaborate (2).

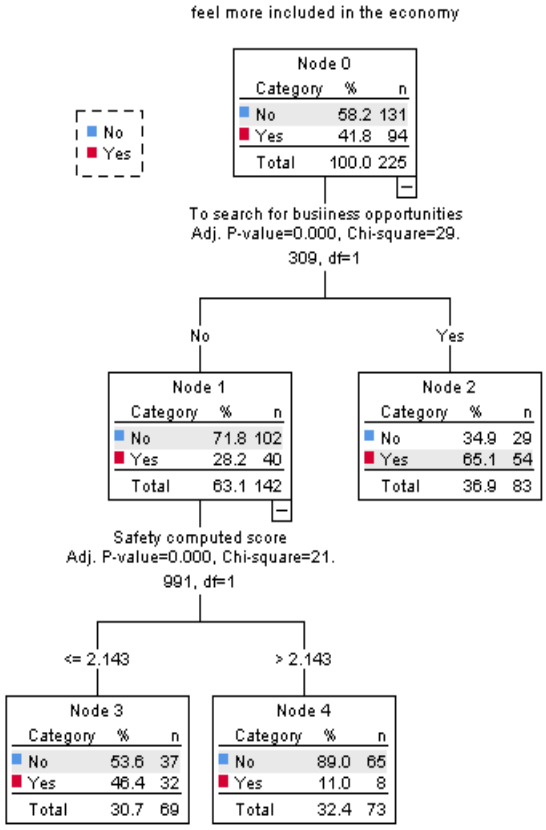

Figure 4: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 4) indicates that 58.2% of the respondents in the Eastern Cape do not feel included in the economy, that is, 131 out of 225 people. According to the tree, the strongest predictor of economic inclusion in the Eastern Cape is using the internet to search for business opportunities because it has the highest Chi-square (29.309) with the lowest p-value (.000). The results indicate that respondents who do not use the internet to search for business opportunities (71.8%) are most likely to feel excluded from the economy, compared with those who do not use the internet to search for

business opportunities (34.9%). Those who do not use the internet to search for business opportunities and who have an average or high level of digital safety are also most likely to feel excluded from the economy (89%), compared with those who do not use the internet to search for business opportunities but do have a low level of digital safety (53.6%). In conclusion, most respondents in the Eastern Cape do not feel included in the economy. Two factors were found to predict the feeling of economic inclusion in the province, namely: using the internet to search for business opportunities (1) and the level of digital safety (2).

2. Free State

2.1 Disengaged Response Bias

Table 2

Number	Questionnaire ID	MAH	p-value
1	1950	21.32257	.00
2	1960	29.18661	.00
3	2000	31.57693	.00
5	1914	35.60551	.00
6	1868	36.28959	.00

According to the results in Table 2, the responses of six out of 150 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis and a normality test was conducted.

2.2 Decision Tree Analyses

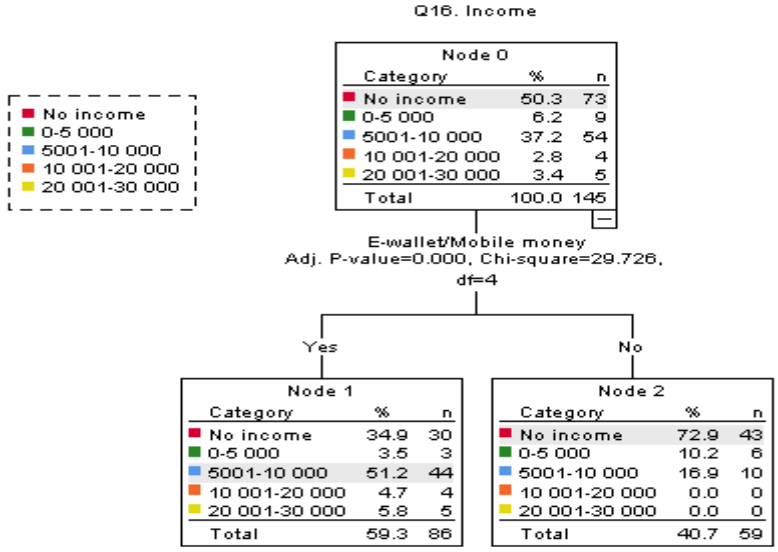

Figure 5: Decision tree of income

The decision tree of income (Figure 5) indicates that most respondents in the Free State (50.3%) have no income. The second highest category is those who earn [R5001–R10 000] (37.2%). Respondents earning [R0–R5000] represent 6.2% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 2.8% and 3.4%, respectively, of the total sample. According to the tree, the strongest predictor of income in the Free State is the e-wallet transaction status as it has the highest Chi-square (29.726) with the lowest p-value (.000). The results indicate that 86 out of 145 respondents (59.3%) who use e-wallet/mobile money (51.2%) earn [R5 001–R10 000]. Those who do not use e-wallet/mobile money (72.9%) are most likely to be respondents with no income. In other words, respondents who use e-wallet are most likely to earn [R5001–R10 000] and those who do not use e-wallet/mobile money are most likely to have no income. In conclusion, the dominant personal income category in the Free State is no income. The personal income level in the province is mainly predicted by the usage of e-wallet/mobile money.

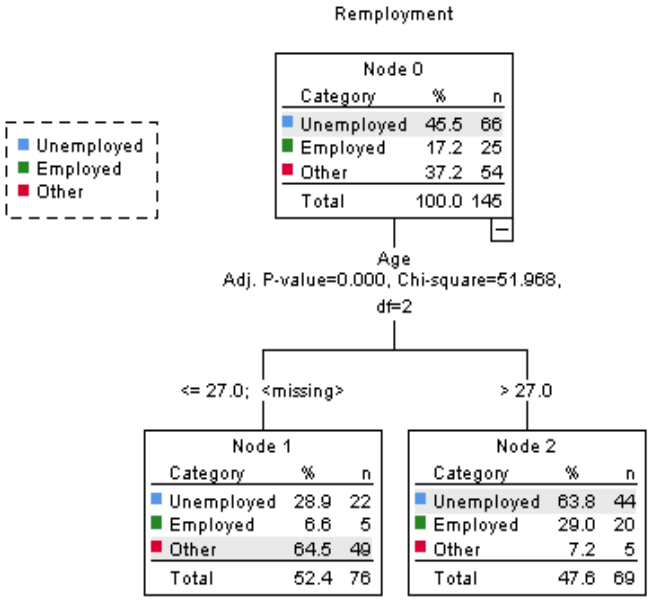

Figure 6: Decision tree of employment status

The decision tree of employment status (Figure 6) indicates that 45.5% of the respondents are unemployed in the Free State, that is, 66 out of 197 people. According to the tree, the strongest predictor of employment status in the Free State is age because it has the highest Chi-square (51.968) with the lowest p-value (.000). The results indicate that respondents who are older than age 27 are most likely to be unemployed (63.8%), compared with those who are age 27 or younger (28.9%). In conclusion, most respondents in the Free State are unemployed. Age was found to the strongest predictor of employment status.

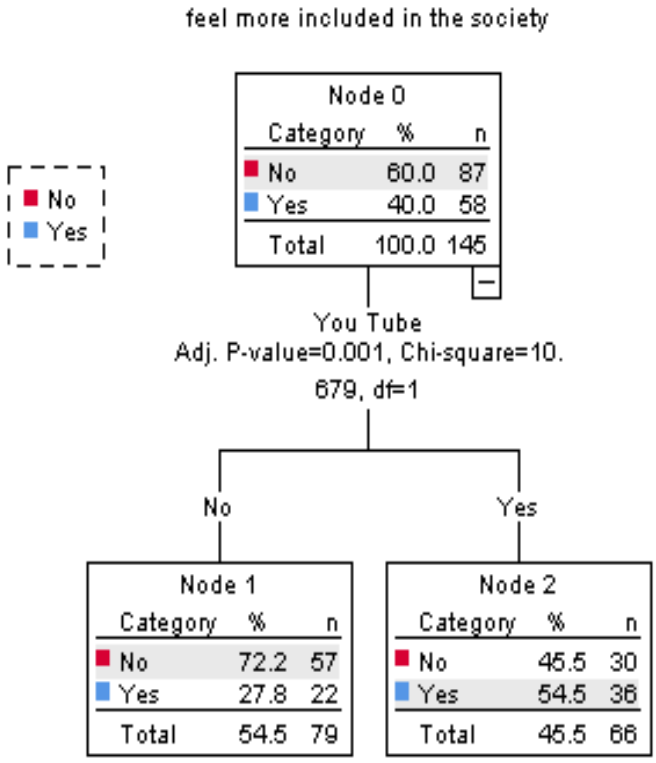

Figure 7: Decision tree of social inclusion

The decision tree of social inclusion (Figure 7) indicates that the majority of the respondents in the Free State feel socially excluded (60%), that is, 87 out of 145 people. According to the tree, the strongest predictor of social inclusion in the Free State is using YouTube because it has the highest Chi-square (10.679) with the lowest p-value (.000). The results indicate that respondents who use YouTube (54.5%) are most likely to feel socially included, compared with those who do not use YouTube (27.8%). In conclusion, most respondents in the Free State feel excluded from society and the use of YouTube was found to be a significant predictor of social inclusion in the province. Participants who use YouTube are more likely to feel socially included than participants who do not.

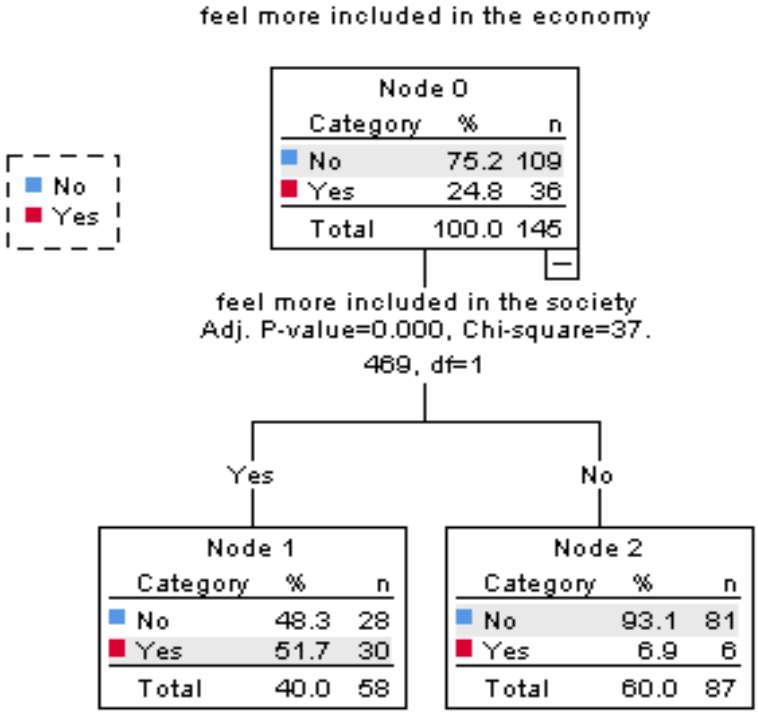

Figure 8: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 8) indicates that 75.2% of the respondents in the Free State do not feel included in the economy, that is, 109 out of 145 people. According to the tree, the strongest predictor of economic inclusion in the Free State is the feeling of being included in the society because it has the highest Chi-square (37.469) with the lowest p-value (.000). The results indicate that respondents who do not feel included in the society (93.1%) are also most likely to feel excluded from the economy. In conclusion, most respondents in the Free State do not feel included in the economy and the feeling of social inclusion was found to be a significant predictor the feeling of economic inclusion.

3. Gauteng

3.1 Disengaged Response Bias

Table 3

Number	Questionnaire ID	MAH	p-value
1	377	18.72823	.00
2	463	18.77860	.00
3	284	19.00360	.00
4	734	19.13698	.00
5	317	19.28213	.00
6	346	20.80990	.00
7	431	20.81581	.00
8	283	21.45703	.00
9	338	22.53768	.00
10	746	22.73525	.00
11	278	22.91282	.00
12	682	22.97782	.00
13	330	23.02491	.00
14	518	24.15065	.00
15	668	24.16067	.00
16	354	24.70846	.00
17	260	25.57851	.00
18	566	26.50665	.00
19	510	27.01216	.00
20	394	27.03502	.00
21	695	31.00867	.00
22	277	31.45791	.00
23	347	41.11586	.00
24	331	46.87285	.00

As indicated in Table 3, Gauteng has large number of outlier respondents. According to the results, the responses of 24 out of 499 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

3.2 Decision Tree Analyses

The decision tree of income (Figure 9) indicates that 65.3% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (16.0%). Respondents earning between 0 and R 5000 represent 6.5% of the sample while respondents with no income represent 8.6%. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 16.0% and 3.6%, respectively, of the total sample. According to the tree, the strongest predictor of income in Gauteng is the employment status as it has the highest Chi-square (510.396) with the lowest p-value (.000). The results indicate that 323 out of 475 respondents (68.0%) are employed full time or part-time from which a large majority (88.5%) earn [R5001–R10 000], compared with those who are self-employed, of which the majority (84%) earn [R10 001–R20 000]. Note that 91.9% of those who are employed and who have a certificate; pre-matric; matric; post-graduate qualification and undergraduate degrees earn [R5001–R10 000]. However, 79.3 % of those who are employed with a certificate also happen to earn [R5001–R10 000]. Those who have a certificate; pre-matric; matric; post-graduate qualification and undergraduate degrees and use the Cell C (86.5%) are most likely to earn [R5001–R10 000]. The results further indicate that respondents who are self-employed/business owners have the highest income, compared with the other employed participants; 84.8% of self-employed/business owners earn [R10 001–R20 000]. In conclusion, the dominant personal income range in Gauteng is [R5001–R10 000]. The personal income level in this province is determined by three main factors, which are: employment status (1), level of education (2) and using Cell C network (3).

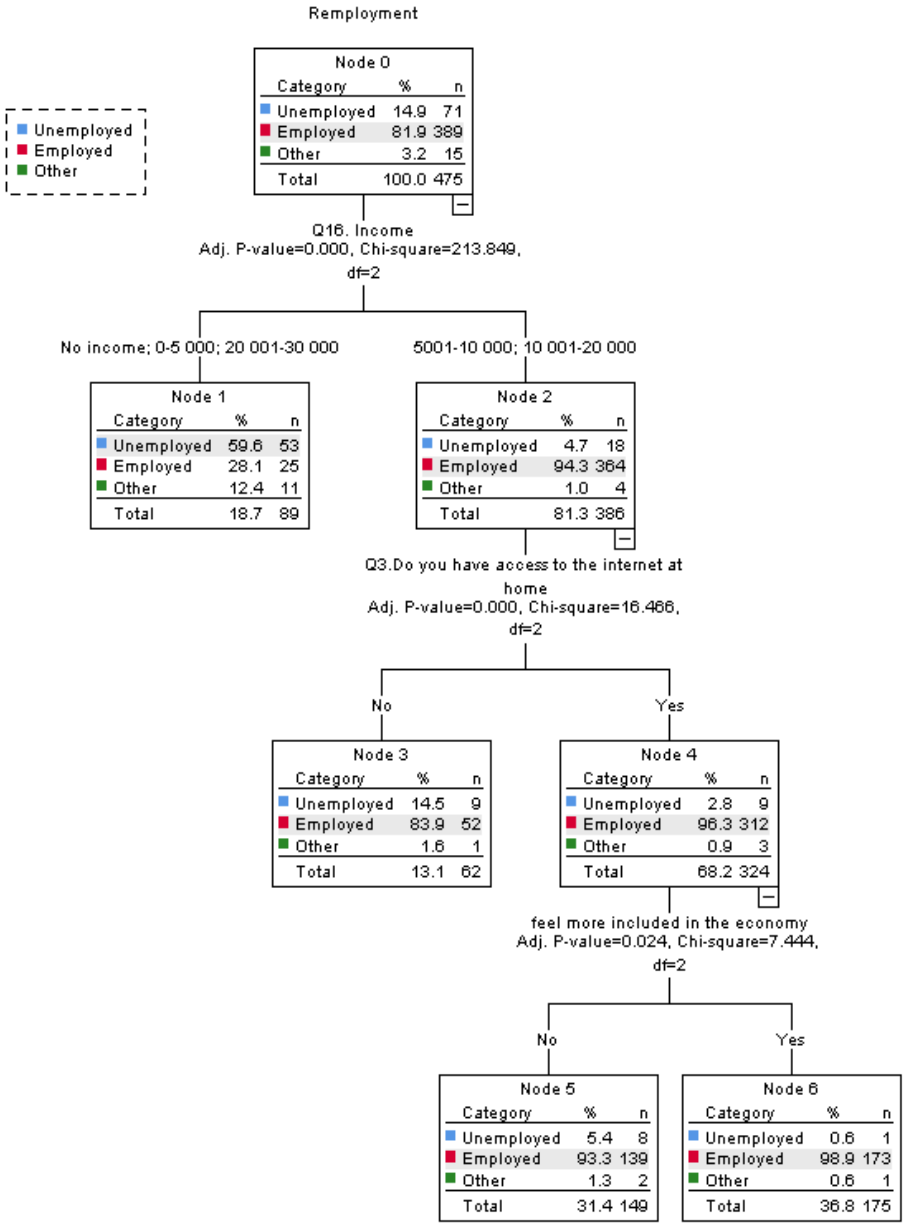

Figure 9: Decision tree of income

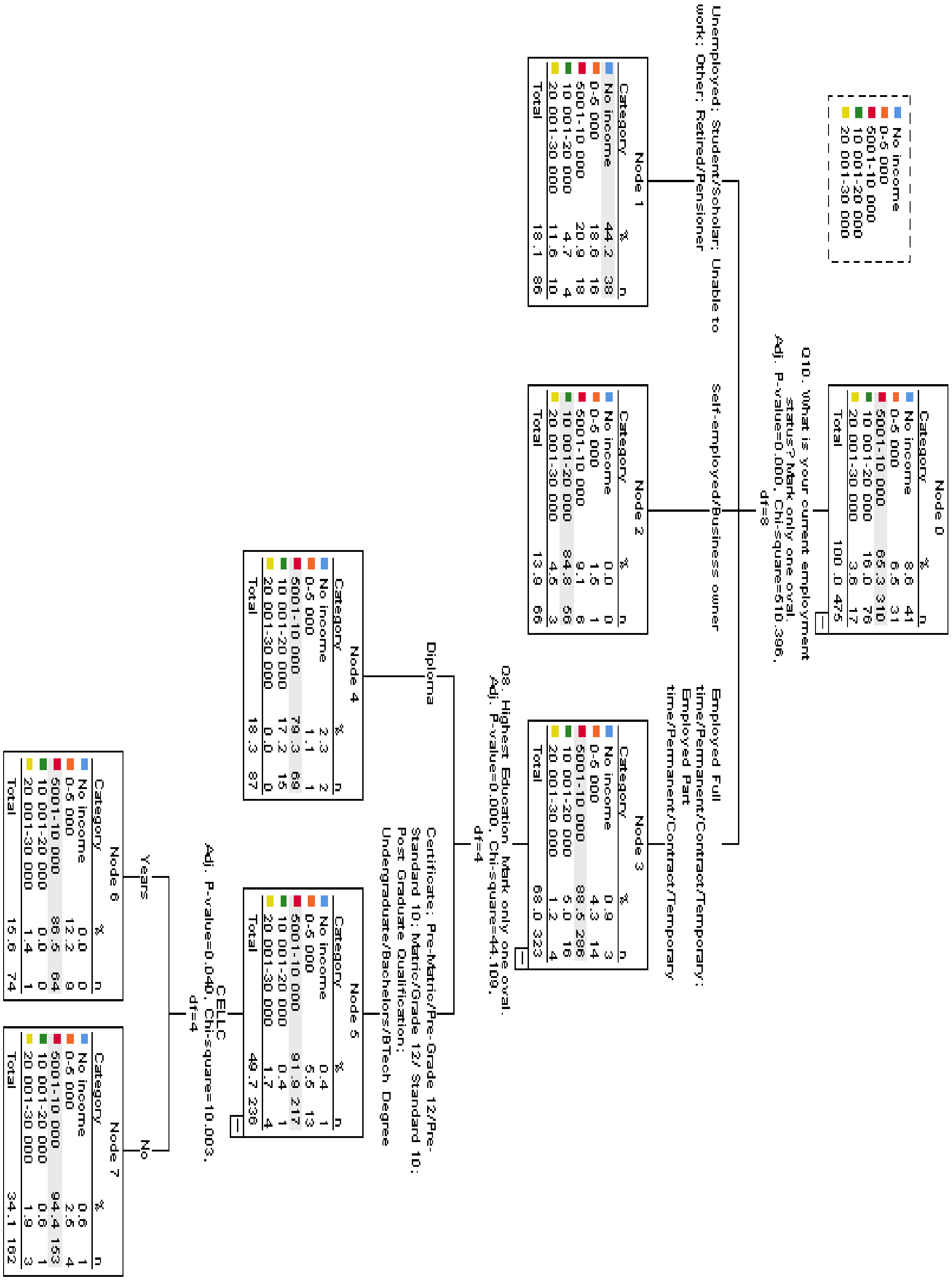

Figure 10: Decision tree of employment status

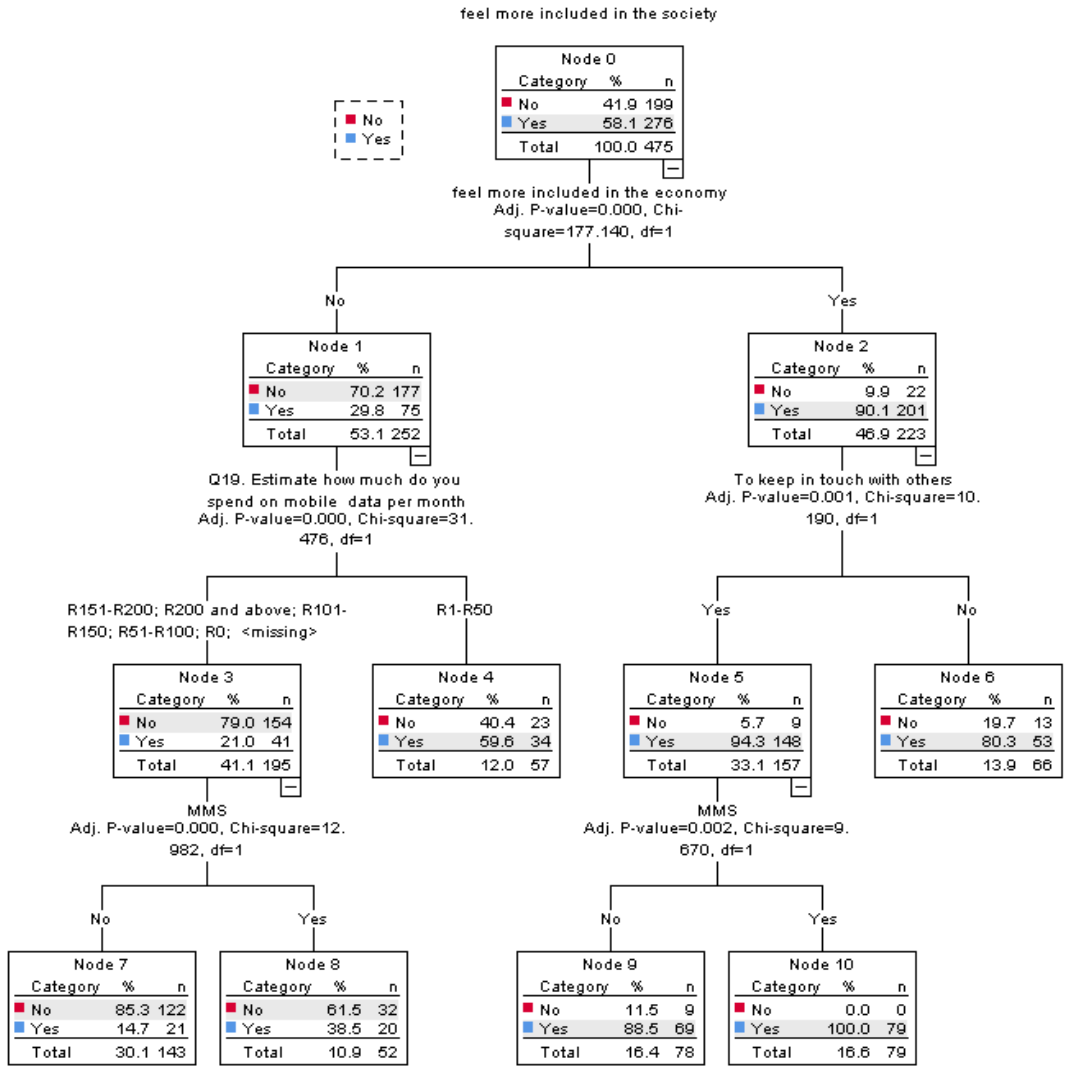

Figure 11: Decision tree of social inclusion

The decision tree of employment status (Figure 10) indicates that 81.9% of the respondents are employed in Gauteng, that is, 389 out of 475 people. According to the tree, the strongest predictor of employment status in Gauteng is monthly income because it has the highest Chi-square (213.849) with the lowest p-value (.000). The results indicate that respondents who earn [R0–R5000 or R20 001–R30 000] are most likely to be unemployed (59.6%), compared with those who earn [R5000–R10 000] (4.7%). Those who earn [R5000–R20 000] and have access to the internet are also most likely to be employed (98.9%) compared

with those with the same level of income but who do not have access to the internet (93.3%). Finally, respondents who earn [R5000–R20 000], who have access to the internet and who feel more included in the economy (98.9%) are more likely to be employed, compared with those in the same category but do not feel included in the economy (93.3%). In conclusion, most respondents in Gauteng are employed. Three factors were found to predict their employment status, namely: personal income (1), having access to the internet (2) and feeling more included in the economy (3).

The decision tree of social inclusion (Figure 11) indicates that 58.1% of the respondents in Gauteng feel socially included, that is, 276 out of 475 people. According to the tree, the strongest predictor of social inclusion in Gauteng is the feeling of economic inclusion because it has the highest Chi-square (177.140) with the lowest p-value (.000). The results indicate that respondents who feel economically included (90.1%) are most likely to also feel socially included. Those who use the internet to keep in touch with others and who use MMS (100.0%) are more likely to feel included in the society, compared with those who use the internet to keep in touch with others but do not use MMS (88.5%). The results also show that of the participants who do not feel economically included and spend from nothing to R200 and above are less likely to feel included in the society (79%), compared with those who do not feel economically included but spend between R1 and R50 (40.4%). In conclusion, most respondents in Gauteng feel included in the society. Four factors were found to predict the feeling of social inclusion, namely: the feeling of being included in the economy (1), using the internet to keep in touch with others (2), the monthly amount spent on data (3) and using MMS (4).

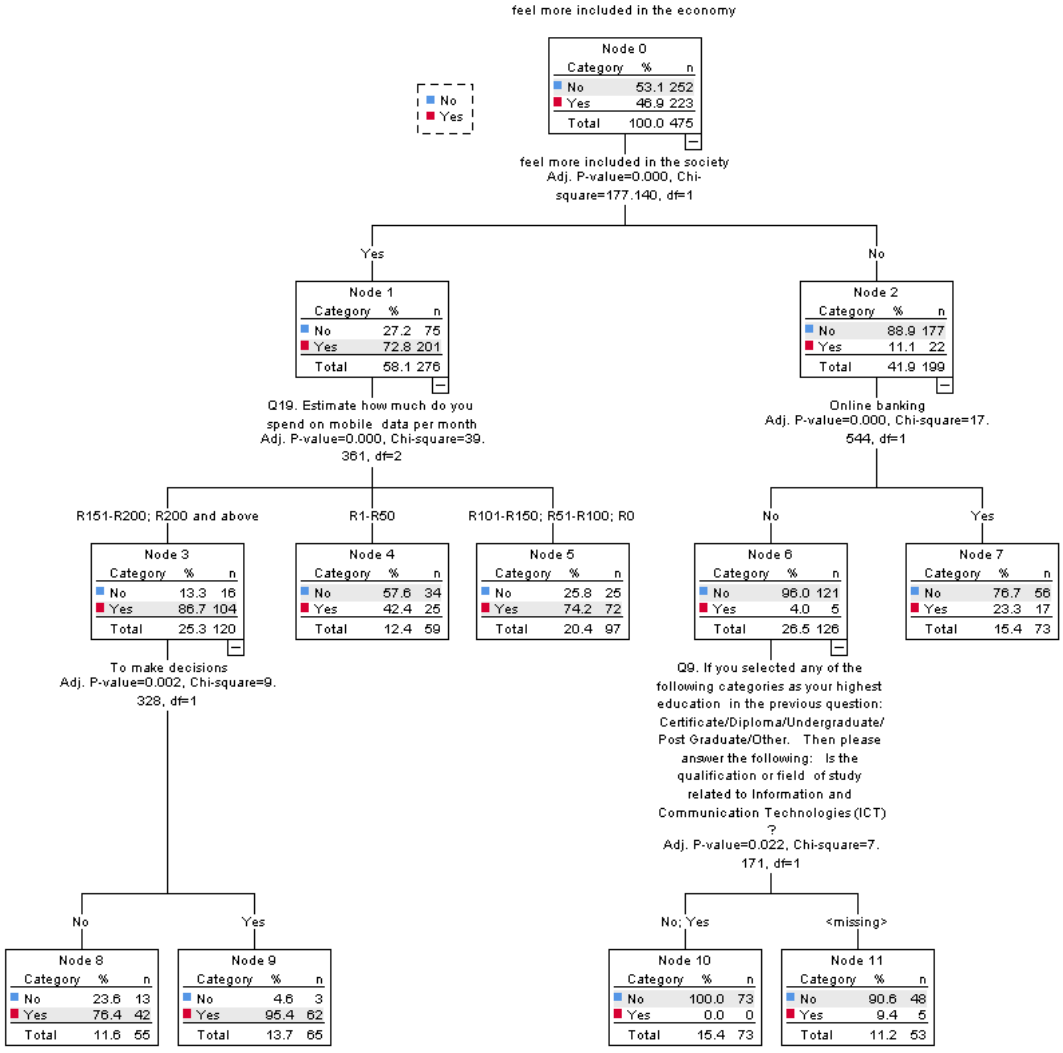

Figure 12: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 12) indicates that 53.1% of the respondents in Gauteng do not feel included in the economy, that is, 252 out of 475 people. According to the tree, the strongest predictor of economic inclusion in Gauteng is the feeling of being included in the society because it has the highest Chi-square (177.140) with the lowest p-value (.000). The results indicate that respondents who feel more included in the society (72.8%) are most likely to also feel included in the economy. Those who feel more included in the society and spend R151 and above on mobile data per month are also most likely to feel

included in the economy (86.7%), compared with those who spend between R1 and R50 (42.4%). Also, those who spend R151 and above on monthly mobile data and use the internet to make decisions are more likely to feel included in the society (95.4%), compared with those who do not use the internet to make decisions (76.4%). On the other hand, participants who do not feel included in the society and who do not use online banking are less likely to feel included in the economy (96%), compared with those who use online banking (76.7%). In conclusion, most respondents in Gauteng do not feel included in the economy. Four factors were found to predict the feeling of economic inclusion in the province, namely: feeling more included in the society (1), monthly expenditure on mobile data (2), using online banking (3) and using the internet to make decisions (4).

4. KwaZulu-Natal

4.1 Disengaged Response Bias

Table 4

Number	Questionnaire ID	MAH	p-value
1	1246		
2	1148	19.27833	.00
3	1348	20.60938	.00
4	1144	20.66564	.00
5	1497	21.49157	.00
6	1386	21.81978	.00
7	1270	22.26328	.00
8	1210	22.73410	.00
9	1131	23.10174	.00
10	1150	23.48370	.00
11	1407	29.35865	.00
12	1301	30.37600	.00

According to the results in Table 4, the responses of 12 out of 500 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

4.2 Decision Tree Analyses

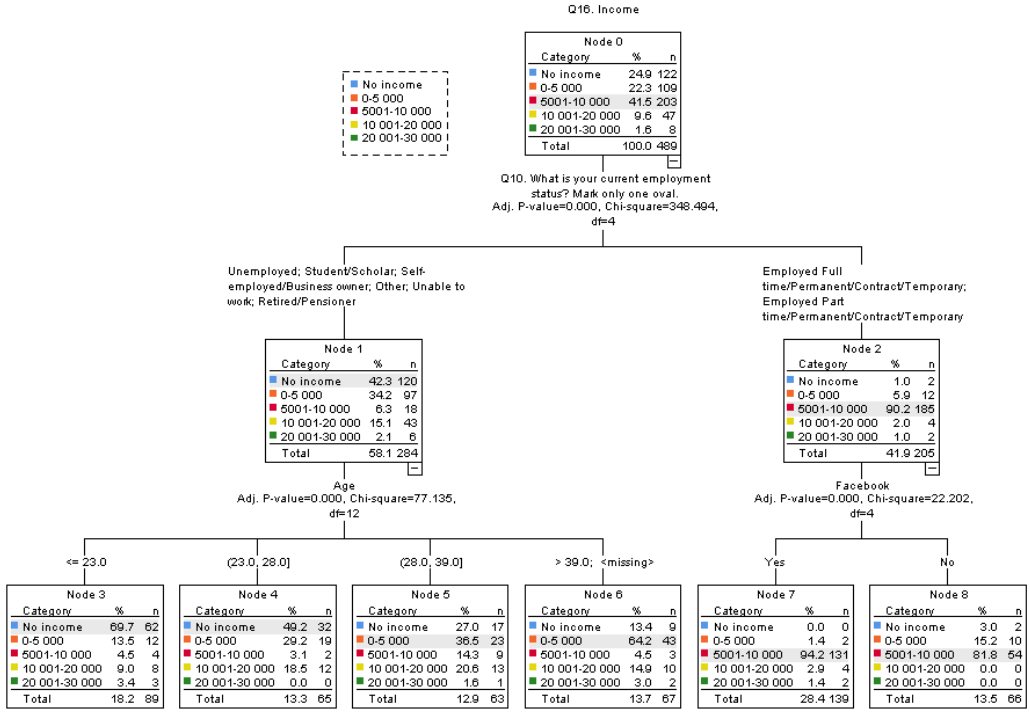

Figure 13: Decision tree of income

The decision tree of income (Figure 13) indicates that 41.5% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (24.9%). Respondents earning [R0–R5000] represent 22.3% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 9.5% and 1.6%, respectively, of the total sample. According to the tree, the strongest predictor of income in KwaZulu-Natal is the employment status as it has the highest Chi-square (348.494) with the lowest p-value (.000). The results indicate that 205 out of 489 respondents (41.9%) are employed from which a large majority (90.2%) earn [R5001–R10 000]. Note that 94.2% of those who are employed and who use Facebook are most likely to earn [R5001–R10 000], compared with those who do not use Facebook (81.8%). However, those who are unemployed are most likely to have no income (42.3%). Those who are unemployed and below age 23 are also more likely to have no income (69.7%), compared with those who are unemployed but are 28 years and older (27%). In conclusion, the dominant personal income range in KwaZulu-Natal is [R5001–

R10 000]. The personal income level in this province is determined by three main factors,

which are: employment status (1), the participant's age group (2) and having a Facebook account (3).

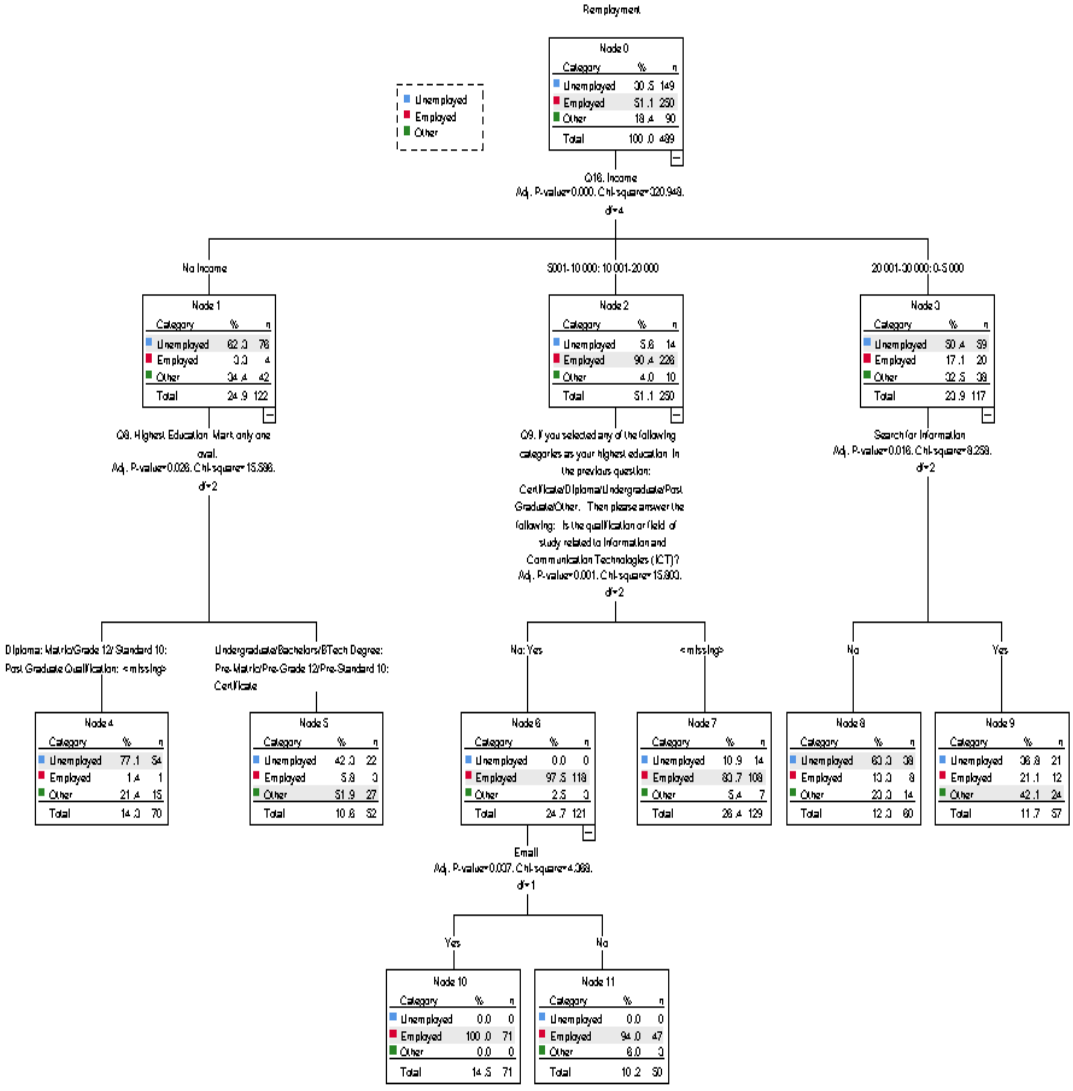

Figure 14: Decision tree of employment status

The decision tree of employment status (Figure 14) indicates that 51.1% of the respondents are employed in KwaZulu-Natal, that is, 250 out of 499 people.

According to the tree, the strongest predictor of employment status in KwaZulu-Natal is income because it has the highest Chi-square (320.948) with the lowest p-value (.000). The results indicate that respondents who earn [R5001–R 20 000] are most likely to be employed (90.4%), compared with those with no income (3.3%) and those who earn [R0–R5000 and R20 001–R30 000] (17.1%). Those who earn [R5001–R20 000], who have a qualification of certificate, diploma, undergraduate degree or post-graduate degree and who have an email account (100%) are most likely to be employed, compared with those who have no email address (92%). On the other hand, participants with no income with matric or post graduate qualification are most likely to be unemployed (71.1%), compared with those with a bachelor's degree and post-matric qualification (42.3%). Participants who earn [R0–R5000] and [R20 001–R30 000] and who do not use the internet to search for information (63.3%) are the most likely to be unemployed, compared with those use the internet to search for information (38.8%). In conclusion, most respondents in KwaZulu-Natal were employed. Five factors were found to predict their employment status, namely: personal income (1), using the internet to search for information (2), level of highest qualification (3), ICT's relation with highest qualification (4) and using email (5).

The decision tree of social inclusion (Figure 15) indicates that 66.9% of the respondents in KwaZulu-Natal feel socially included, that is, 327 out of 499 people. According to the tree, the strongest predictor of social inclusion in KwaZulu-Natal is the usage of WhatsApp because it has the highest Chi-square (11.907) with the lowest p-value (.000). The results indicate that respondents who use WhatsApp (72.5%) are most likely to feel socially included, compared with those who do not use WhatsApp (45.6%). Those in rural or peri-urban area who use WhatsApp are more likely to feel socially included (78.1%), compared with those who use WhatsApp and live in urban areas (61.5%). In addition, participants who live in rural or peri-urban areas and use the internet for business (87.1%) are more likely to feel socially included, compared with those who do not use the internet for business (74.7%). And those in urban area and who do not use YouTube are most likely to feel socially included (70.1%), compared with those who use YouTube (52.4%). In conclusion, most respondents in KwaZulu-Natal feel included in the society. Four factors were found to predict their feeling of social inclusion, namely: using WhatsApp (1), the areas participants live (2), using the internet for business (3) and using YouTube (4).

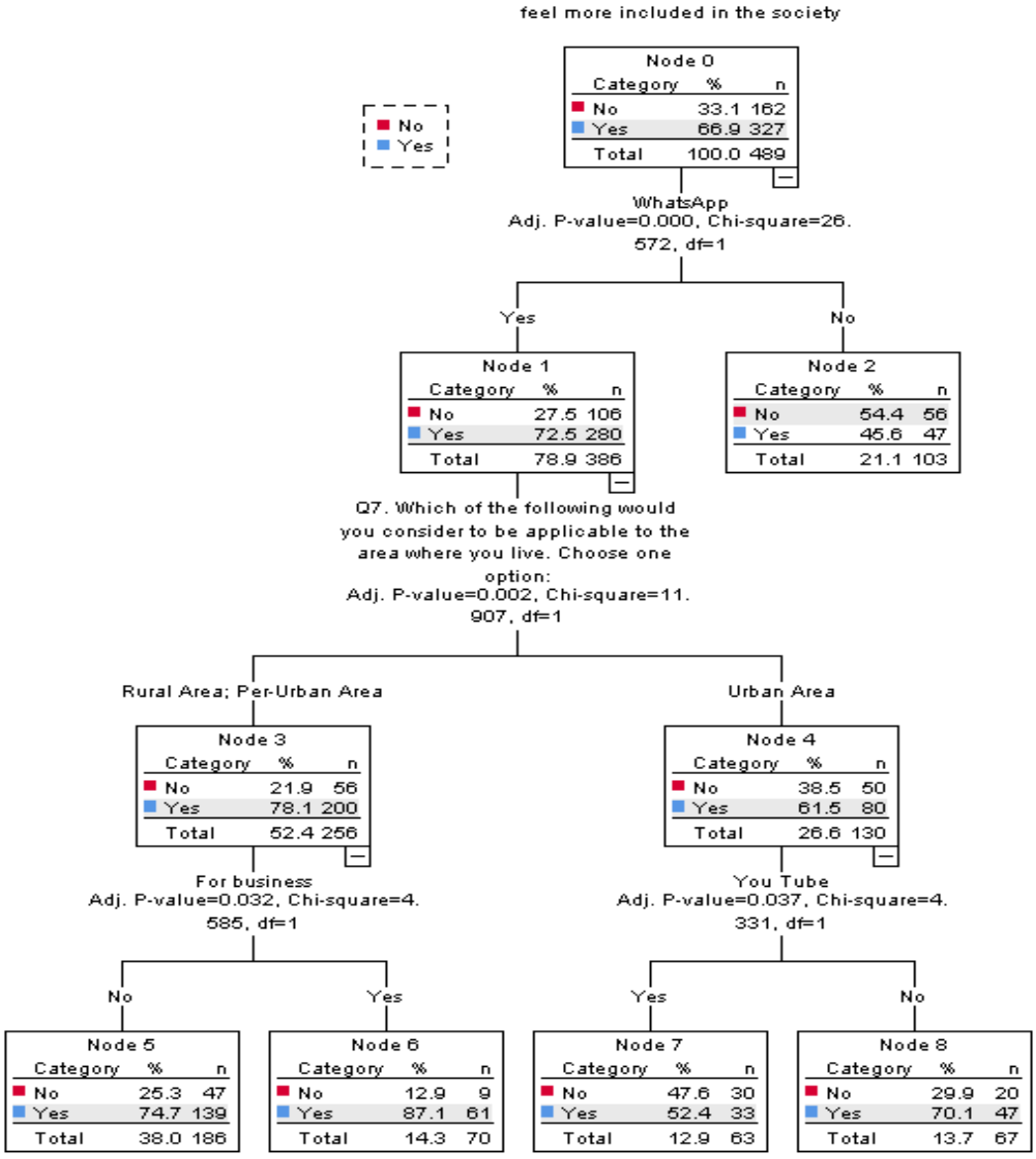

Figure 15: Decision tree of social inclusion

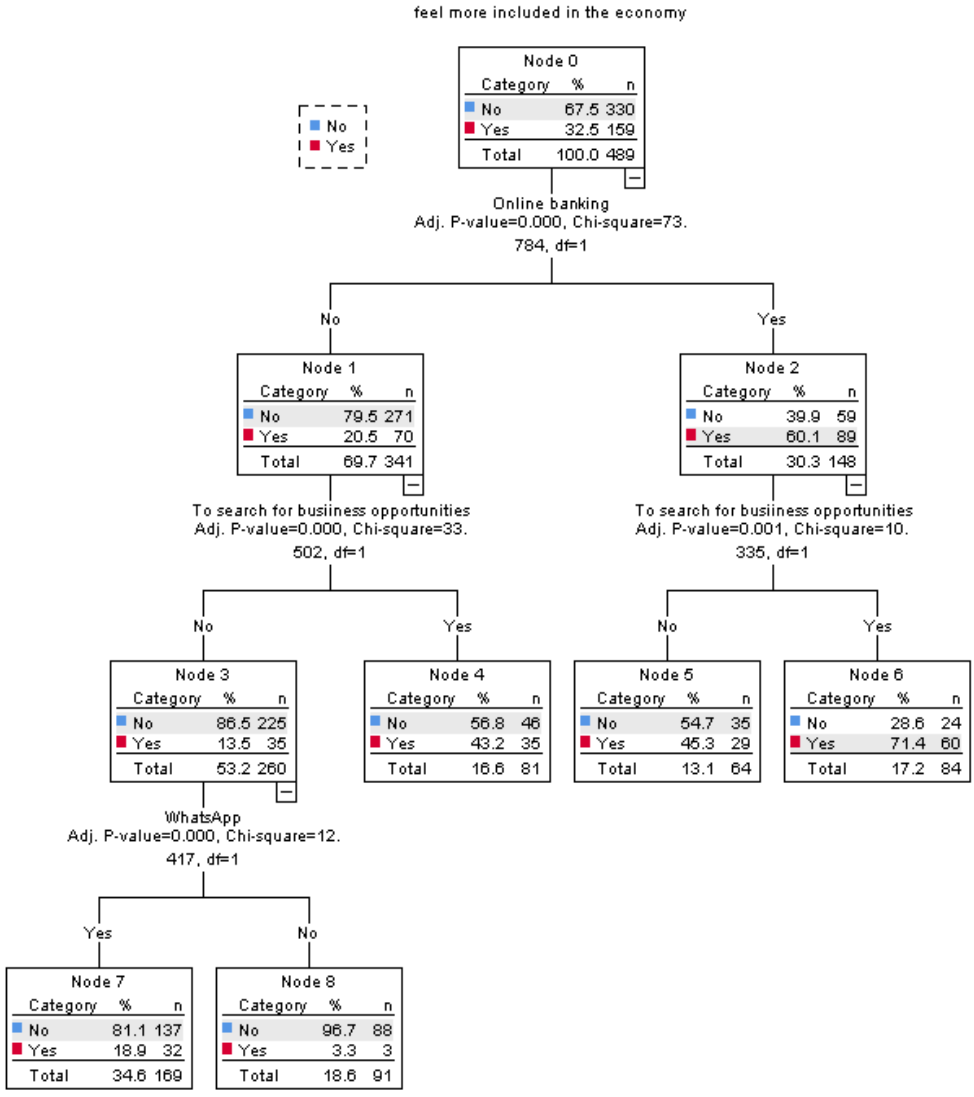

Figure 16: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 16) indicates that 67.5% of the respondents in KwaZulu-Natal do not feel included in the economy, that is, 330 out of 489 people. According to the tree, the strongest predictor of economic inclusion in KwaZulu-Natal is online banking because it has the highest Chi-square (73.784) with the lowest p-value (.000). The results indicate that respondents who do not use online banking (79.5%) are most likely to feel

excluded from the economy, compared with those who do use online banking (39.9%). Those who use online banking and use the internet to search for business opportunities are most likely to feel included in the economy (71.4%), compared with those who do not use the internet to search for business opportunities (45.3%). On the other hand, participants who do not use online banking and who use the internet to search for business opportunities (43.2%) are more likely to feel included in the economy, compared with those who use online banking but do not use the internet to search for business opportunities (13.5%). Those who use WhatsApp are to feel less socially excluded (18.9%), compared with those who do not use WhatsApp (3.3%). In conclusion, most respondents in KwaZulu-Natal do not feel included in the economy. Three factors were found to predict the feeling of economic inclusion in the province, namely: using online banking (1), using the internet to search for business opportunities (2) and using WhatsApp (3).

5. Limpopo

5.1 Disengaged Response Bias

Table 5

Number	Questionnaire ID	MAH	p-value
1	241	19.22978	.00
2	112	19.55686	.00
3	155	19.55686	.00
4	156	19.55686	.00
5	162	19.55686	.00
6	231	19.90017	.00
7	247	22.45383	.00
8	109	24.04319	.00
9	89	25.05228	.00
10	95	27.39877	.00
11	87	30.49188	.00
12	4	41.60613	.00
13	122	46.25405	.00
14	106	57.37807	.00
15	160	89.65491	.00
16	186	113.24002	.00

Sixteen participants from Limpopo were removed from the analysis to avoid any bias related to disengaged responses. According to the results in Table 5, the

responses of 16 out of 250 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving.

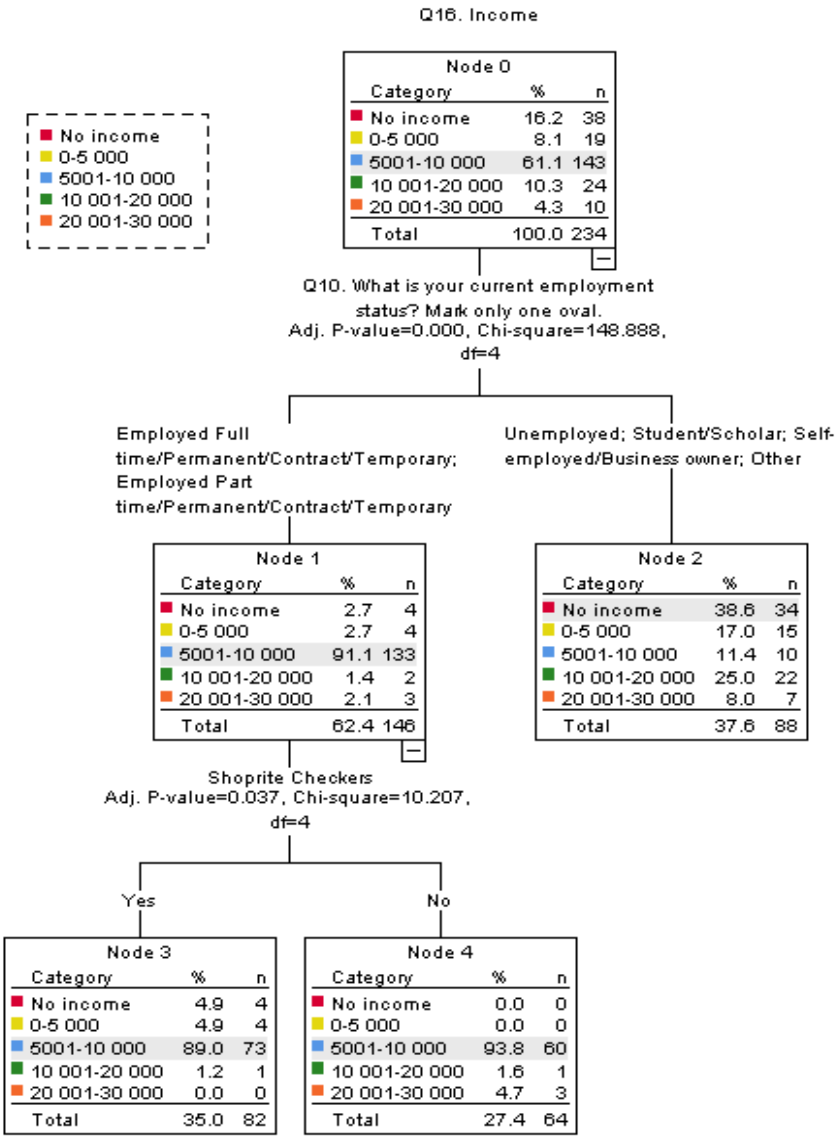

Figure 17: Decision tree of income

The decision tree of income (Figure 17) indicates that 61.1% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (16.2%). Respondents earning [R0–R5000] represent 17% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 10.3% and 4.3%, respectively, of the total sample. According to the tree, the strongest predictor of income in Limpopo is the employment status as it has the highest Chi-square (148.888) with the lowest p-value (.000). The results indicate that respondents (91.1%) who belong to the category Employ full time/ part time, contract, etc. are most likely to earn [R5001–R10 000], compared with those who are unemployed, students etc. who earn no income (38.6%). Note that 93.8% of those who are employed and who do not use Shoprite/Checkers to transfer money earns [R5001–R10 000]. However, 89.0% of those who are employed and use Shoprite/Checkers to transfer money also happen to earn [R5001–R10 000]. In conclusion, the dominant personal income range in Limpopo is [R5001–R10 000]. The personal income level in this province is determined by two main factors, which are: employment status (1) and ways of transferring money (2).

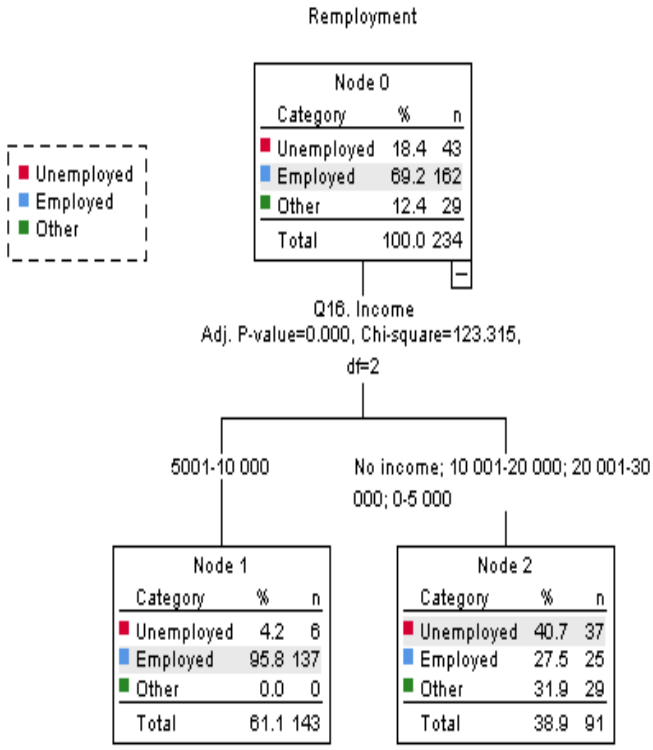

Figure 18: Decision tree of employment status

The decision tree of employment status (Figure 18) indicates that 69.2% of the respondents are employed in Limpopo, that is, 162 out of 234 people. According to the tree, the strongest predictor of employment status in Limpopo is income because it has the highest Chi-square (123.315) with the lowest p-value (.000). The results indicate that respondents with a household income of [R5001–R10 000] are most likely to be employed (95.8%), compared with those who earn [R0–R500], [R10 001–R20 000] or [R20 001–R30 000] and those with no income (27.5%). In conclusion, most respondents in Limpopo are employed. Income was found to predict their employment status.

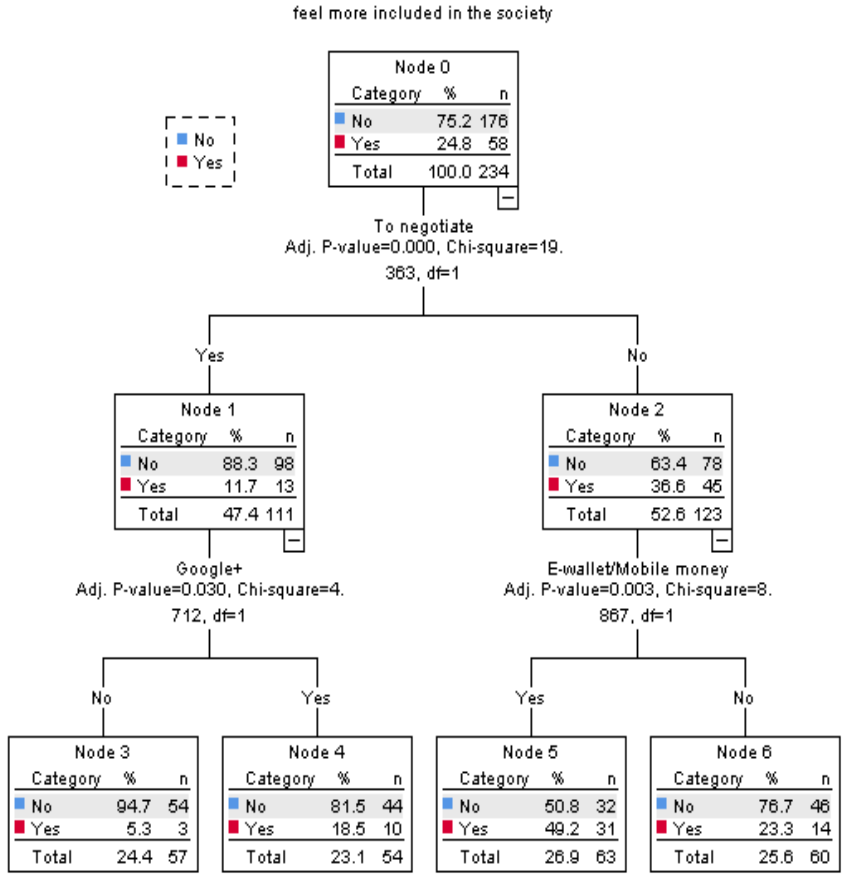

Figure 19: Decision tree of social inclusion

The decision tree of social inclusion (Figure 19) indicates that 75.2% of the respondents in Limpopo feel socially excluded, that is, 176 out of 234 people. According to the tree, the strongest predictor of social inclusion in Limpopo is using the internet to negotiate because it has the highest Chi-square (19.363) with the lowest p-value (.000). The results indicate that respondents who use the internet to negotiate (88.0 %) are most likely to feel socially excluded, compared with those who do not use the internet to negotiate (63.4.3%). Those who use the internet to negotiate and do not use Google are more likely to feel socially excluded (94.7%), compared with those who use Google (81.5%). On the other hand, participants who do not use the internet to negotiate and who do not use e-wallet and mobile money (76.7%) are more likely to feel more socially excluded, compared with those who use e-wallet and mobile money (50.8%). In conclusion, most respondents in Limpopo feel excluded from society. Three factors were found to predict their feeling of social inclusion, namely: using the internet to negotiate (1), having a Google account (2) and using e-wallet/mobile money to transfer (3).

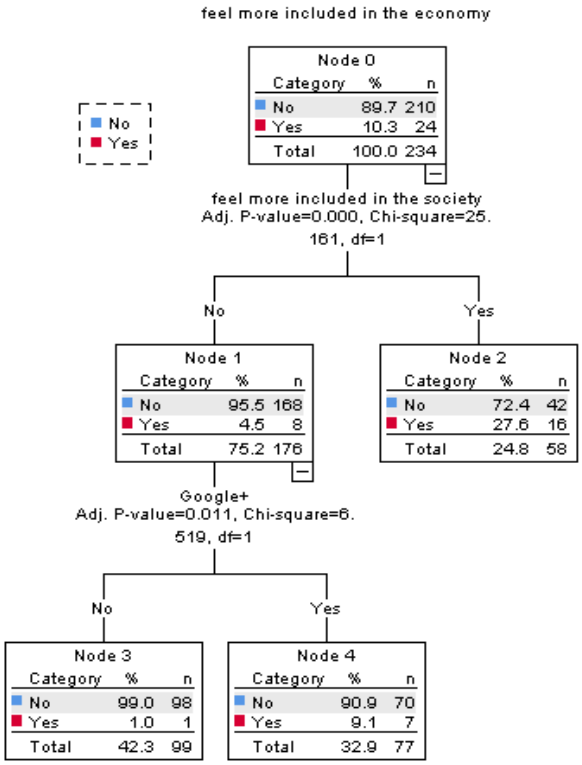

Figure 20: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 20) indicates that 89.7% of the respondents in Limpopo do not feel included in the economy, that is, 210 out of 234 people. According to the tree, the strongest predictor of economic inclusion in Limpopo is the feeling of social inclusion because it has the highest Chi-square (25.161) with the lowest p-value (.000). The results indicate that respondents who do not feel more included in the society (95.5%) are most likely to also feel excluded from the economy. Those who do not feel socially included and who do not use a Google account are also most likely to feel excluded from the economy (99%), compared with those who use Google (90.9%). In conclusion, most respondents in Limpopo do not feel included in the economy. Two factors were found to predict the feeling of economic inclusion in the province, namely: the feeling of being included in the society (1) and using a Google account (2).

6. Mpumalanga

6.1 Disengaged Response Bias

Table 6

Number	Questionnaire ID	MAH	p-value
1	1632	19.52547	.00
2	1705	20.77400	.00
3	1703	20.77400	.00
4	1555	20.77400	.00
5	1587	20.77400	.00
6	1704	20.80869	.00
7	1571	22.52892	.00
8	1608	25.43782	.00
9	1564	30.76042	.00
10	1572	38.23898	.00
11	1629	39.67066	.00

Table 6 indicates the respondents who can be a potential source of bias in Mpumalanga. According to the results, the responses of 11 out of 250 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

6.2 Decision Tree Analyses

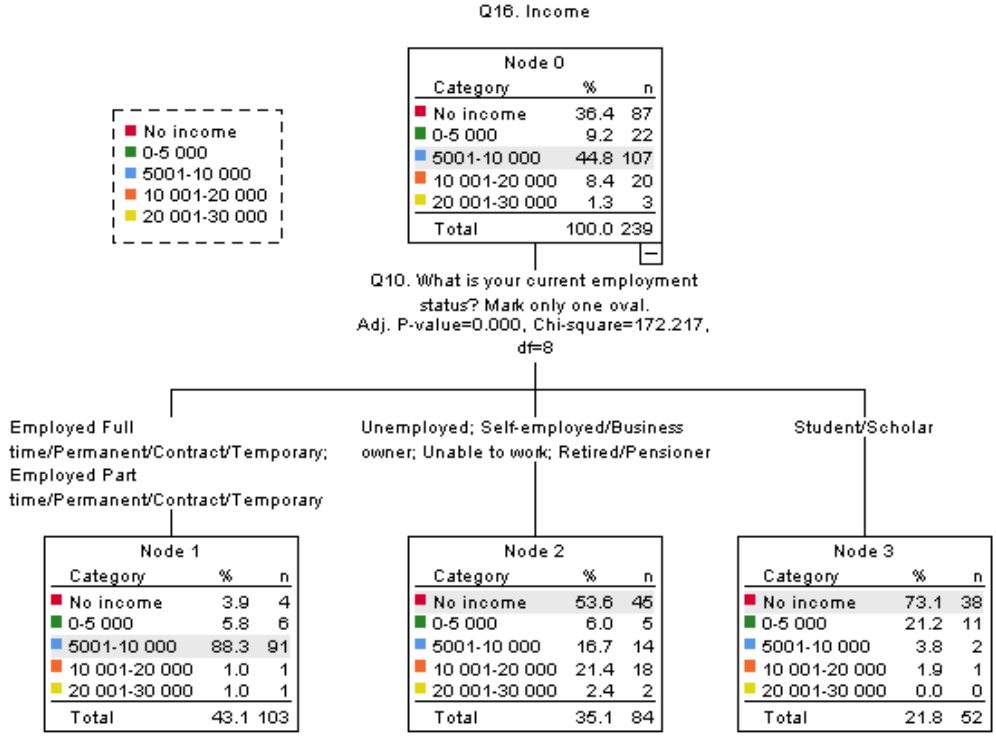

Figure 21: Decision tree of income

The decision tree of income (Figure 21) indicates that 44.8% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (36.4%). Respondents earning [R0–R5000] represent 9.2% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 8.4% and 1.3%, respectively, of the total sample. According to the tree, the strongest predictor of income in Mpumalanga is the employment status as it has the highest Chi-square (172.217) with the lowest p-value (.000). The results indicate that 103 out of 239 respondents (43.1%) are employed of which a large majority (88.3%) earns [R5001–R10 000], 84 out of 239 respondents (35.1%) are unemployed from which the majority (53.6%) do not earn at all and 52 out of 239 are students (21.8%) again the large majority (73.1%) have no income. In conclusion, the dominant personal income range in Mpumalanga is [R5001–R10 000]. The personal income level in this province is determined by employment status.

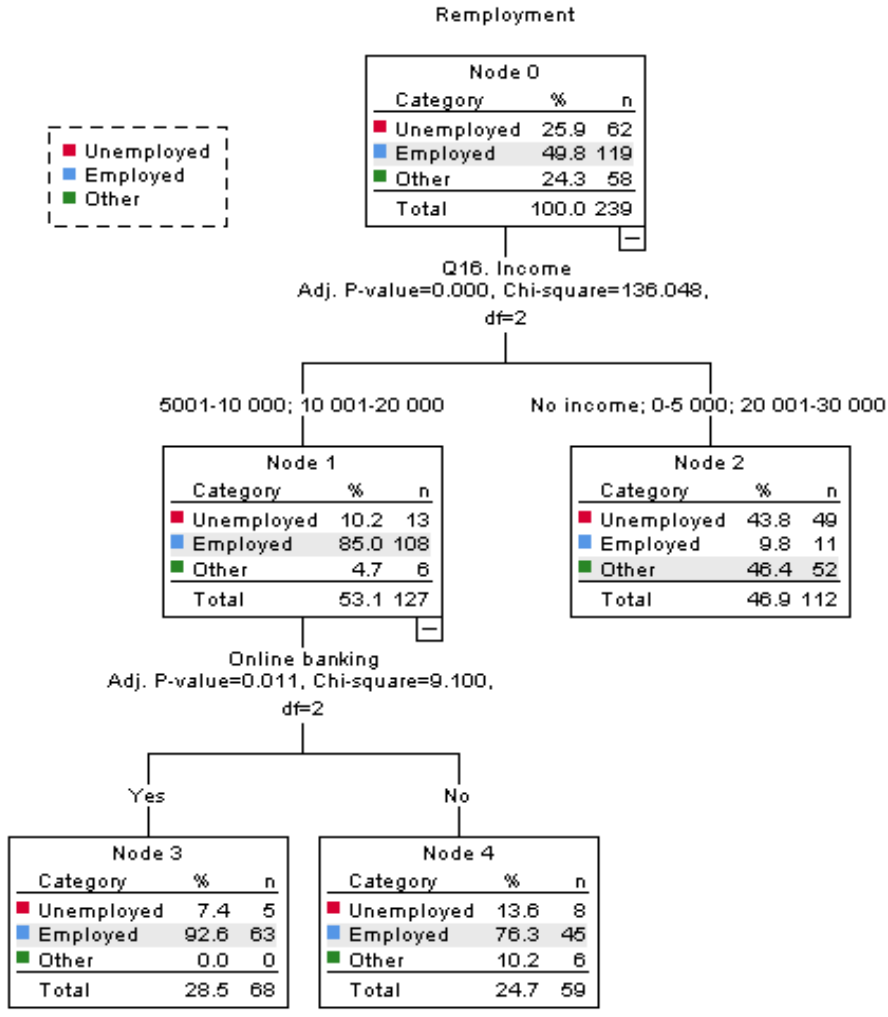

Figure 22: Decision tree of employment status

The decision tree of employment status (Figure 22) indicates that only 49.8% of the respondents are employed in Mpumalanga, that is, 119 out of 239 people. According to the tree, the strongest predictor of employment status in Mpumalanga is income because it has the highest Chi-square (136.048) with the lowest p-value (.000). The results indicate that respondents with an income of [R5001–R20 000] (85%) are most likely to be employed, compared with those who earn [R0–R5000] and [R20 000–R30 000] (9.8%). Those who earn [R5000–R20 000] and use online banking are also most likely to be employed (92.6%), compared with those with the same level of income but who do not use online

banking (76.3%). In conclusion, most respondents in Mpumalanga are unemployed. Two factors were found to predict their employment status, namely: income (1) and using online banking (2).

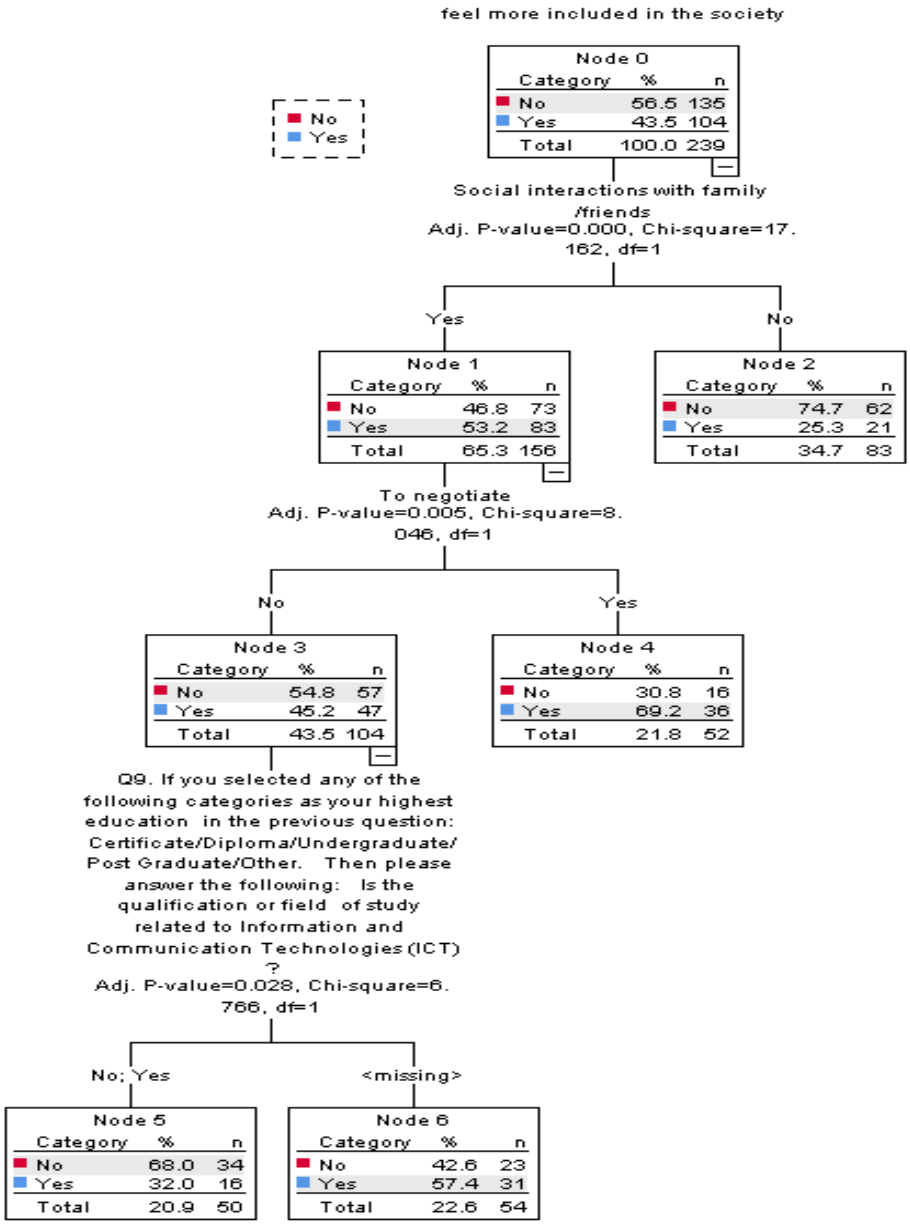

Figure 23: Decision tree of social inclusion

The decision tree of social inclusion (Figure 23) indicates that 56.5% of the respondents in Mpumalanga feel socially excluded, that is, 135 out of 239 people. According to the tree, the strongest predictor of social inclusion in Mpumalanga is the usage of online platforms for social interaction with family/friends because it has the highest Chi-square (17.162) with the lowest p-value (.000). The results indicate that respondents who use online forums to interact with family/friends (69.2%) are most likely to feel socially included, compared with those who do not use online platforms to interact with family/friends (45.2%). Those who use the internet to negotiate are more likely to feel socially included (69.2%), compared with those who do not use the internet to negotiate (46.2%). In conclusion, most respondents in Mpumalanga feel excluded in the society. Two factors were found to predict their feeling of social inclusion, namely: using online platforms to interact with family/friends (1) and using the internet to negotiate (2).

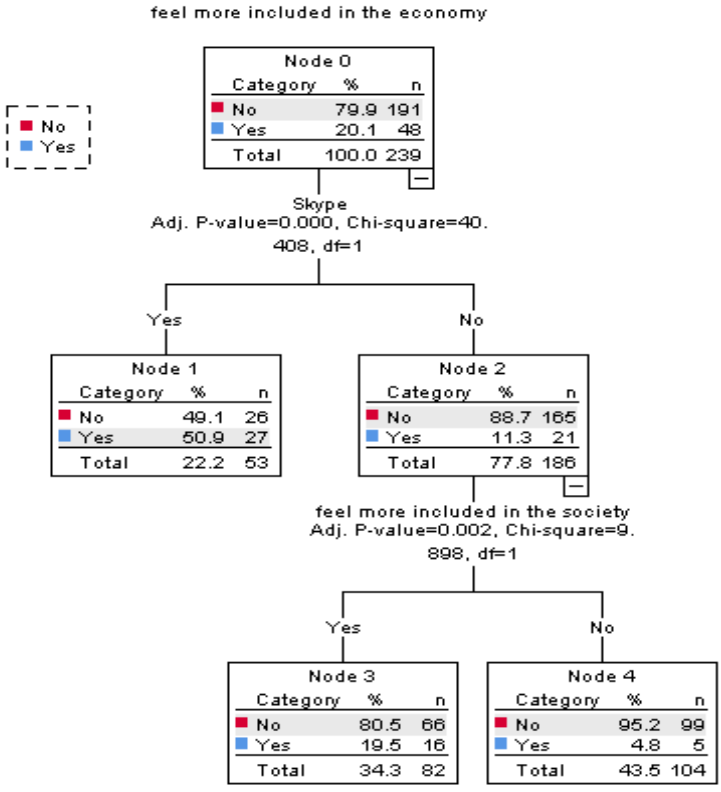

Figure 24: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 24) indicates that 79.9% of the respondents in Mpumalanga do not feel included in the economy, that is, 191 out of 239 people. According to the tree, the strongest predictor of economic inclusion in Mpumalanga is using the internet to Skype because it has the highest Chi-square (40.408) with the lowest p-value (.000). The results indicate that respondents who use the internet to Skype (50.9%) are most likely to feel included in the economy, compared with those who do not use the internet to Skype (11.3%). Those who do not use the internet to Skype and who do not feel included in the society are also most likely to feel excluded from the economy (95.2%), compared with those who do not use the internet to Skype but feel more included in the society (80.5%). In conclusion, most respondents in Mpumalanga do not feel included in the economy. Two factors were found to predict the feeling of economic inclusion in the province, namely: using the internet to Skype (1) and the feeling of being more included in the society (2).

7. Northern Cape

7.1 Disengaged Response Bias

Table 7

Number	Questionnaire ID	MAH	p-value
1	2763	19.27705	.00
2	2965	19.36322	.00
3	2765	20.07951	.00
4	2825	21.29277	.00
5	2939	21.87877	.00
6	2894	25.83571	.00
7	2980	26.79016	.00
8	2994	71.58299	.00

Table 7 pinpoints respondents who can be a potential source of bias. According to the results, the responses of eight out of 250 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

7.2 Decision Tree Analyses

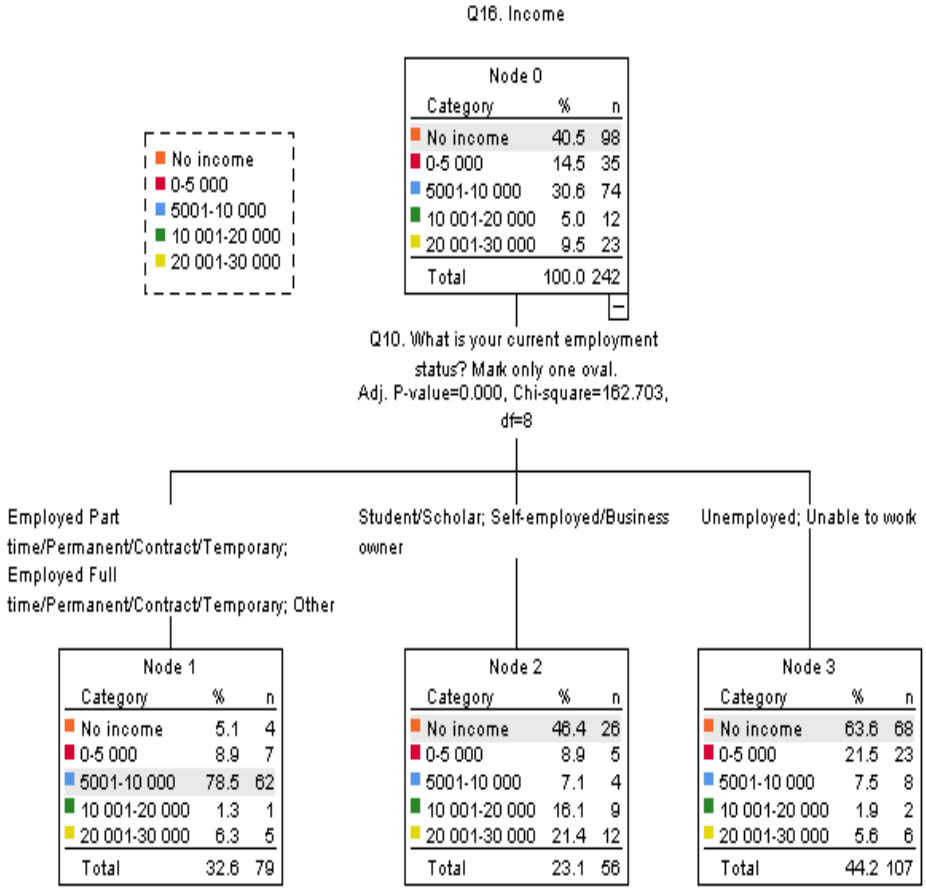

Figure 25: Decision tree of income

The decision tree of income (Figure 25) indicates that 40.5% of the respondents do not earn any income. The second highest category is those who earn [R5001–R10 000] (30.6%). Respondents earning [R0–R5000] represent 14.5% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 5.0% and 9.5%, respectively, of the total sample. According to the tree, the strongest predictor of income in the Northern Cape is the employment status as it has the highest Chi-square (162.703) with the lowest p-value (.000). The results indicate that respondents who are employed (78.5%) are most likely to earn [R5001–R10 000] while those who are unemployed are most likely to have

no income (63.6%). In conclusion, no income is the dominant personal income range option in the Northern Cape. The personal income level in this province is primarily determined by employment status.

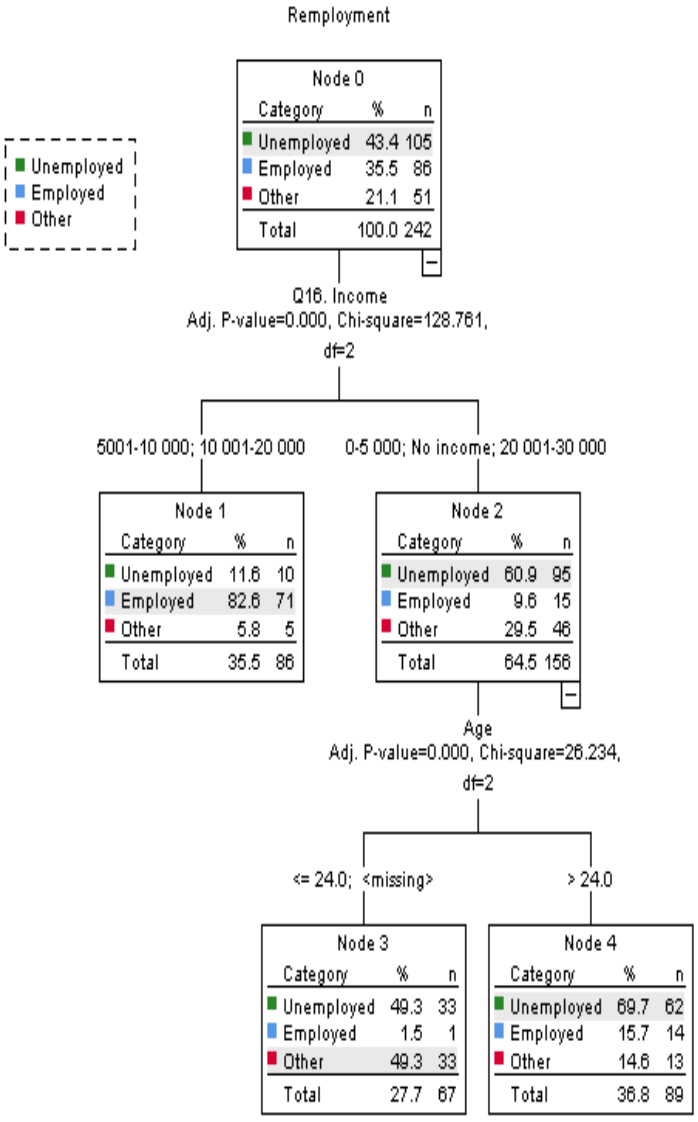

Figure 26: Decision tree of employment status

The decision tree of employment status (Figure 26) indicates that only 43.4% of the respondents are employed in the Northern Cape, that is, 105 out of 232 people. According to the tree, the strongest predictor of employment status in the Northern Cape is income because it has the highest Chi-square (128.761) with the lowest p-value (.000). The results indicate that respondents with an income of [R5001–R20 000] are most likely to be employed, compared with those who have no income, or who earn [R0–R5000] or [R20 001–R30 000] (9.6%). Those who either have no income or earn [R0–R5000] or [R20 001–R30 000] and who are older than age 24 are also most likely to be unemployed (69.7%), compared with those who are aged 24 or younger (49.3%). In conclusion, few people are employed in the Northern Cape. Two factors were found to predict their employment status, namely: personal income (1) and age group (2).

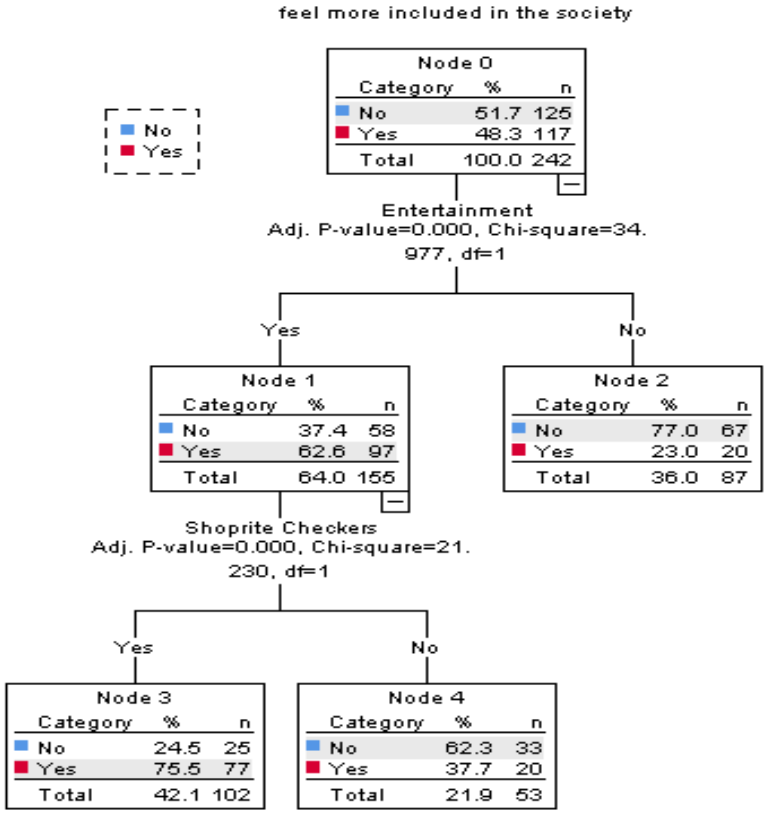

Figure 27: Decision tree of social inclusion

The decision tree of social inclusion (Figure 27) indicates that 51.7% of the respondents in the Northern Cape feel excluded from the society, that is, 125 out of 242 people. According to the tree, the strongest predictor of social inclusion in the Northern Cape is using the internet for entertainment as it has the highest chi-square (34.977) with the lowest p-value (.000). The results indicate that respondents who use the internet for entertainment (62.6%) are most likely to feel socially included, compared with those who use the internet for entertainment (23.0%). Those who use the internet for entertainment and who use Shoprite/Checkers to transfer money are more likely to feel socially included (75.5%), compared with those who use the internet for entertainment but do not transfer money via Shoprite/Checkers (37.7%). In conclusion, most respondents in the Northern Cape feel excluded in the society. Two factors were found to predict their feeling of social inclusion, namely: using the internet for entertainment (1) and using Shoprite/Checkers to transfer money (2).

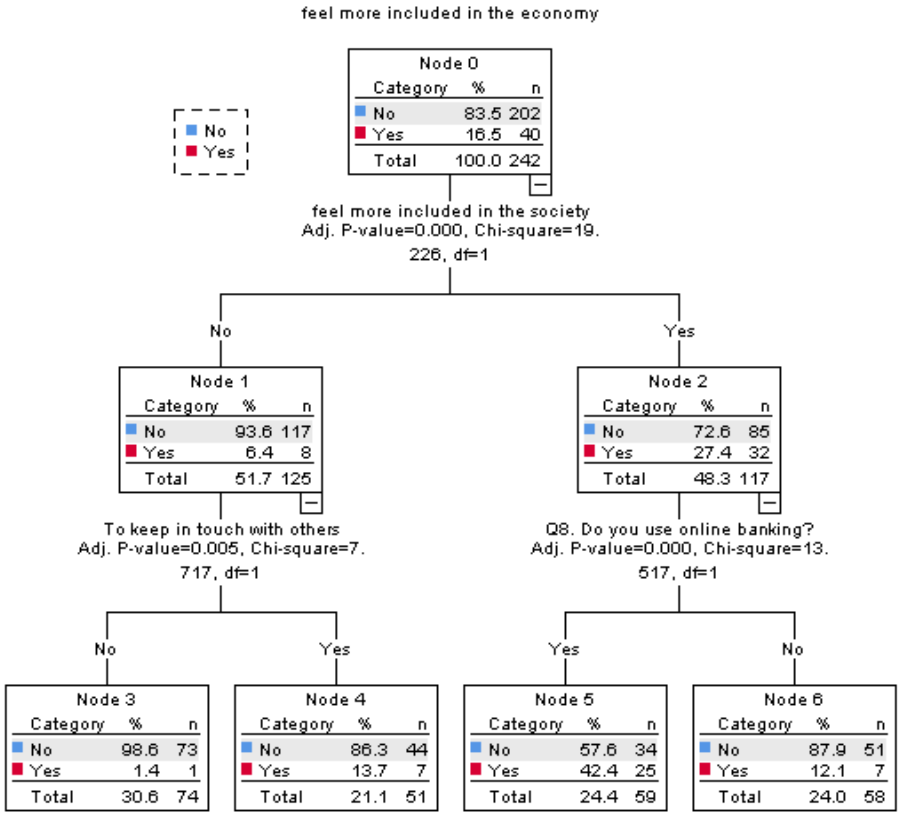

Figure 28: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 28) indicates that 83.5% of the respondents in the Northern Cape do not feel included in the economy, that is, 202 out of 242 people. According to the tree, the strongest predictor of economic inclusion in the Northern Cape is the feeling of social inclusion because it has the highest Chi-square (19.226) with the lowest p-value (.000). The results indicate that respondents who do not feel more included in the society (93.6%) are most likely to feel excluded from the economy, compared with those who feel more included in the society (72.6%). Those who do not feel included in the society and do not use the internet to keep in touch with others are also most likely to feel excluded from the economy (98.6%), compared with those who do not feel more included in the society but use the internet to keep in touch with others (86.3%). On the other hand, those who feel more included in the society and use online banking are more likely to also feel included in the economy (42.4%), compared with those who feel more included in the society but do not use online banking (12.1%). In conclusion, most respondents in the Northern Cape do not feel included in the economy. Three factors were found to predict the feeling of economic inclusion, namely: the feeling of inclusion in the society (1), using the internet to keep in touch with others (2) and using online banking (3).

8. North West

8.1 Disengaged Response Bias

Table 8

Number	Questionnaire ID	MAH	p-value
1	839	20.85951	.00
2	1001	22.95190	.00
3	806	24.07809	.00
4	877	27.96637	.00
5	897	30.26624	.00

According to the results in Table 8, the responses of five out of 251 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore, these participants were removed from the analysis to avoid any bias related to disengaged responses.

8.2 Decision Tree Analyses

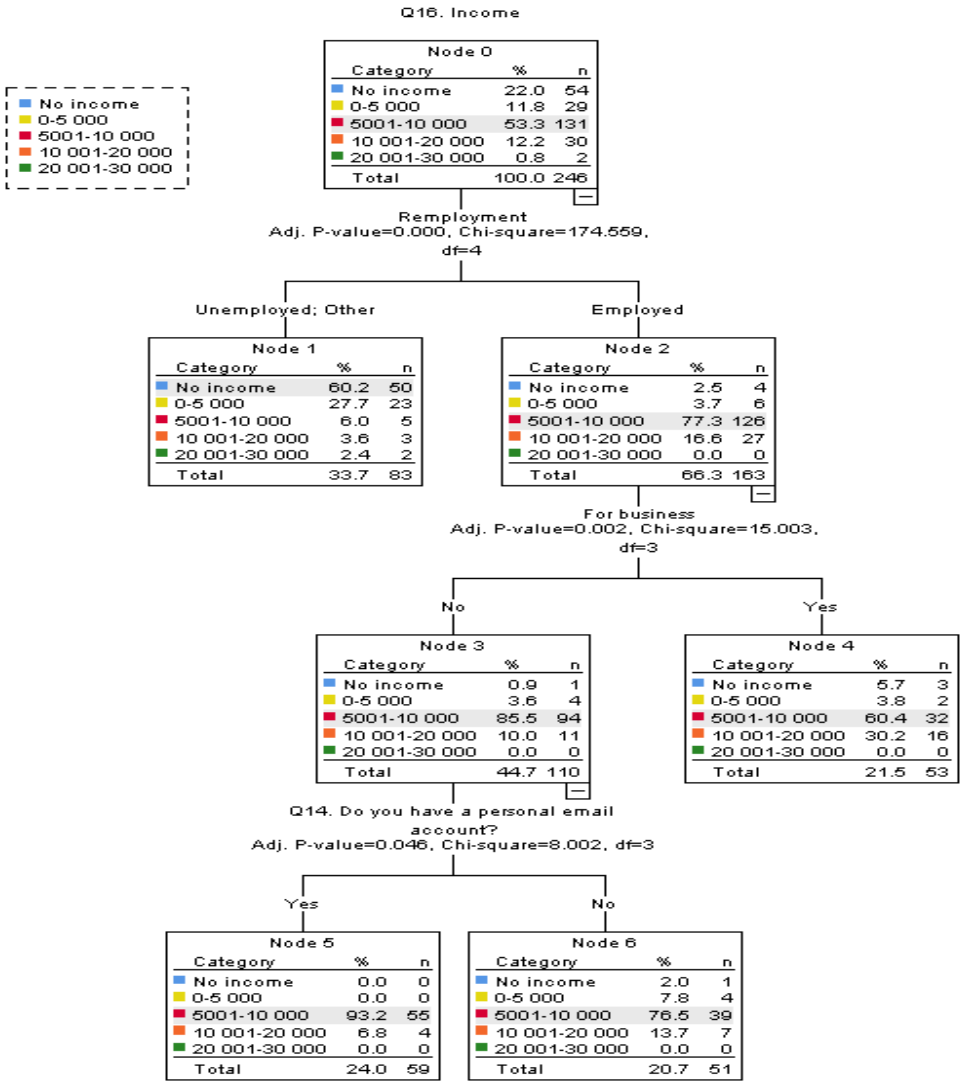

Figure 29: Decision tree of income

The decision tree of income (Figure 29) indicates that 53.3% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (22.0%). Respondents earning [R0–R5000] represent 11.8% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 12.2% and 0.8%, respectively, of the total sample. According to the tree, the

strongest predictor of income in North West is the employment status as it has the highest chi-square (174.559) with the lowest p-value (.000). The results indicate that 163 out of 246 respondents (66.3%) are employed from which a large majority (77.3%) earn [R5001–R10 000], compared with the 82 unemployed participants from whom the majority have no income (60.2%). Note that 85.5% of those who are employed and who do not use the internet for business earn [R5001–R10 000]. However, 60.4 % of those who are employed but do not use the internet for business also happen to earn [R5001–R10 000]. Those who have personal email accounts (93.2%) are most likely to earn [R5001–R10 000], compared with those with no personal email account (76.5%). In conclusion, the dominant personal income range in North West is [R5001–R10 000]. The personal income level in this province is determined by three main factors, namely: employment status (1), having an email address (2) and using the internet for business (3).

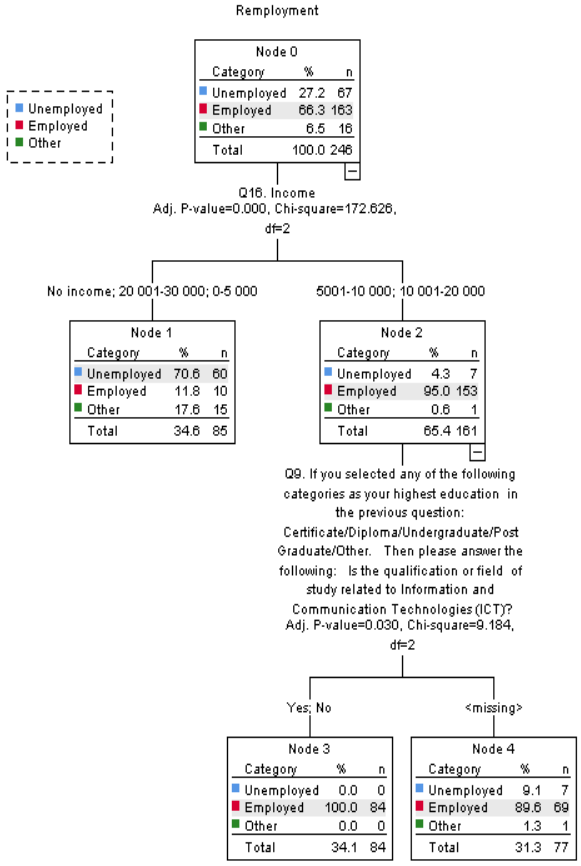

Figure 30: Decision tree of employment status

The decision tree of employment status (Figure 30) indicates that 66.3% of the respondents are employed in North West, that is, 163 out of 246 people. According to the tree, the strongest predictor of employment status in North West is income because it has the highest Chi-square (172.626) with the lowest p-value (.000). The results indicate that respondents with a household income of [R5001–R20 000] are most likely to be employed (95%), compared with those who have no income or earn [R0–R5000] and [R20 000–R30 000] (11.8%). Those who earn [R5001–R20 000] and have a qualification of certificate, diploma, undergraduate degree or post-graduate degree which is related or unrelated to ICT are also most likely to be employed (100%). In conclusion, most respondents in North West are employed. Two factors were found to predict their employment status, namely: income (1) and level of qualifications (2).

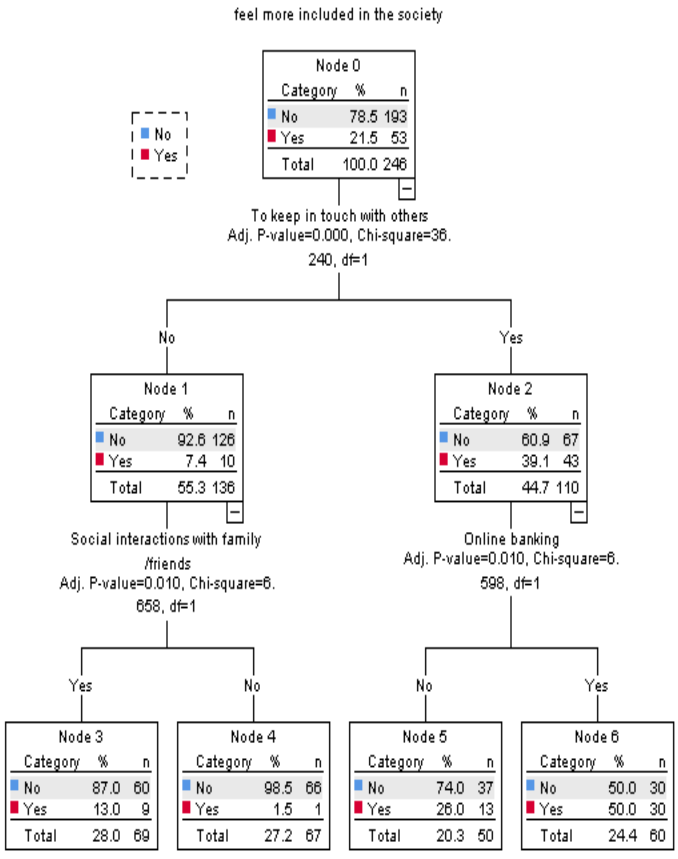

Figure 31: Decision tree of social inclusion

The decision tree of social inclusion (Figure 31) indicates that 78.5% of the respondents in North West feel socially excluded, that is, 193 out of 246 people. According to the tree, the strongest predictor of social inclusion in North West is using the internet to keep in touch with others because it has the highest chi-square (36.240) with the lowest p-value (.000). The results indicate that respondents who use the internet to keep in touch with others (39.1%) are most likely to feel socially included, compared with those who do not use the internet to keep in touch with other (7.4%). Those who use the internet to keep in touch with others and who use online banking are also more likely to feel socially included (50.0%), compared with those who use the internet to keep in touch with others but do not use online banking (26.0%). On the other hand, people who do not use the internet to keep in touch with others and who do not use online platforms to socially interact with family/friends are more likely to feel excluded from the society (98.5%), compared with those who do not use social media to keep in touch with others but use online platforms to socially interact with family/friends (87%). In conclusion, most respondents in North West feel excluded from the society. Three factors were found to predict their feeling of social inclusion, namely: using the internet to keep in touch with others (1), participation in online forums to interact with family/friends (2) and using online banking (3).

The decision tree of economic inclusion (Figure 32) indicates that 84.6% of the respondents in North West do not feel included in the economy, that is, 208 out of 246 people. According to the tree, the strongest predictor of economic inclusion in North West is the feeling of more included in the society because it has the highest Chi-square (46.042) with the lowest p-value (.000). The results indicate that respondents who do not feel more included in the society (92.7%) are also most likely to feel excluded from the economy. Those who do feel more included in the society and who do not use online banking are most likely to feel excluded from the economy (97.9%), compared with those who do not feel more included in the society but use online banking (78.0%). In addition, those who have a Facebook account (100%) are most likely to feel excluded from the economy, compared with those who do not use a Facebook account (94.9%). In conclusion, most respondents in North West do not feel included in the economy. Three factors were found to predict the feeling of economic inclusion in the province, namely: feeling more included in the society (1), using online banking (2) and using a Facebook account (3).

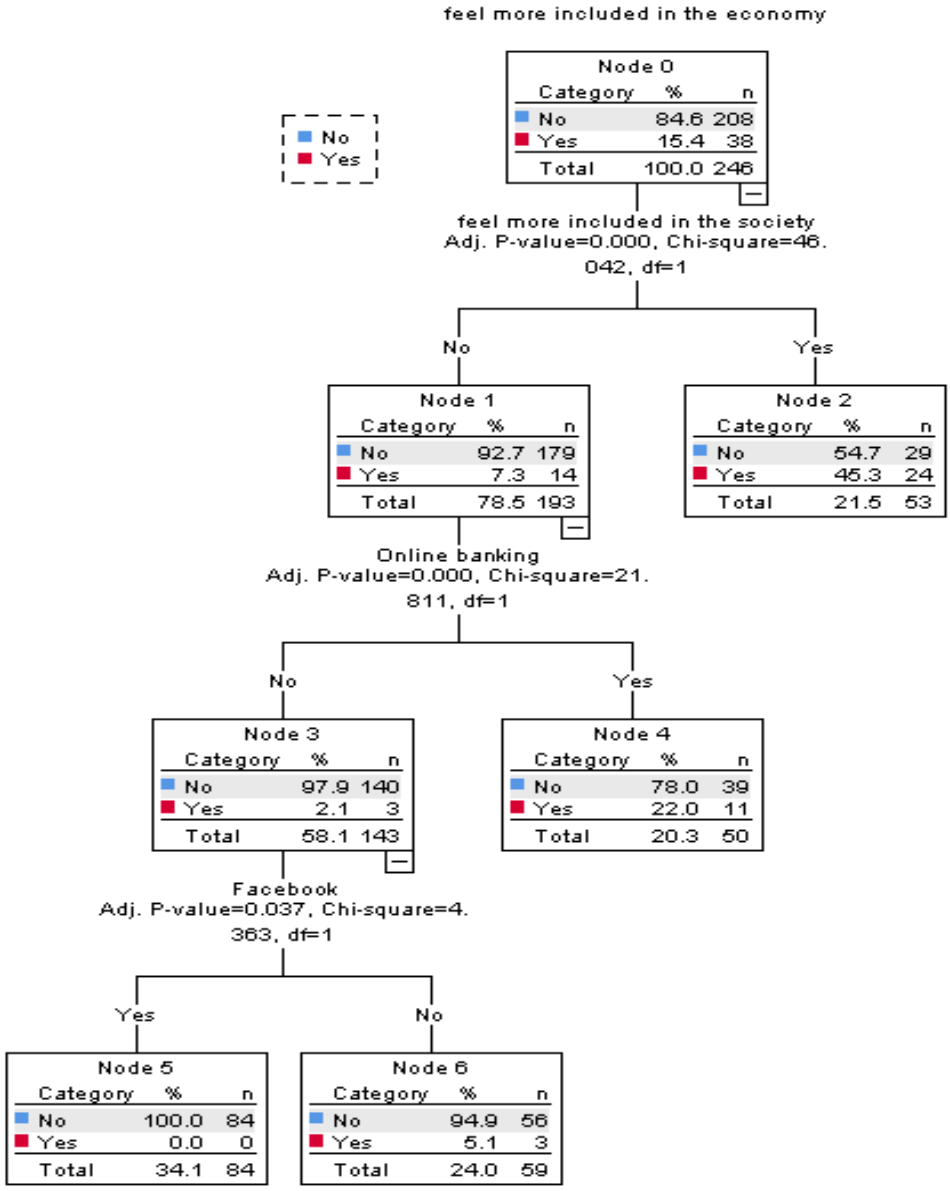

Figure 32: Decision tree of economic inclusion

9. Western Cape

9.1 Disengaged Response Bias

Table 9

Number	Questionnaire ID	MAH	p-value
1	2462	18.97251	.00
2	2161	19.13989	.00
3	2038	19.14205	.00
4	2077	19.41971	.00
5	2005	19.54434	.00
6	2219	19.73820	.00
7	2078	19.87824	.00
8	2002	20.24193	.00
9	2118	20.27397	.00
10	2225	20.29229	.00
11	2130	20.34893	.00
12	2224	20.50960	.00
13	2074	20.81101	.00
14	2071	20.98360	.00
15	2499	20.98561	.00
16	2060	21.23972	.00
17	2466	21.26919	.00
18	2435	21.49057	.00
19	2133	21.49057	.00
20	2144	21.49057	.00
21	2258	21.99446	.00
22	2046	22.64024	.00
23	2340	22.83096	.00
24	2348	23.01326	.00
25	2117	23.18082	.00
26	2284	23.63811	.00
27	2173	24.77161	.00
28	2050	25.04764	.00
29	2059	26.00548	.00
30	2057	27.33583	.00
31	2100	28.00810	.00

32	2327	28.99864	.00
33	2106	32.72146	.00
34	2352	36.98428	.00
35	2146	37.15750	.00
36	2214	38.77810	.00

The Western Cape has the highest number of disengaged respondents as compared to the other eight provinces. According to the results in Table 9, the responses of 36 out of 500 participants deviate significantly from the average variance of the six constructs considered in the survey, namely: general self-efficacy, ICT self-efficacy, information and data literacy, communication and collaboration, safety, and problem solving. Therefore these participants were removed from the analysis to avoid any bias related to disengaged responses.

9.2 Decision Tree Analyses

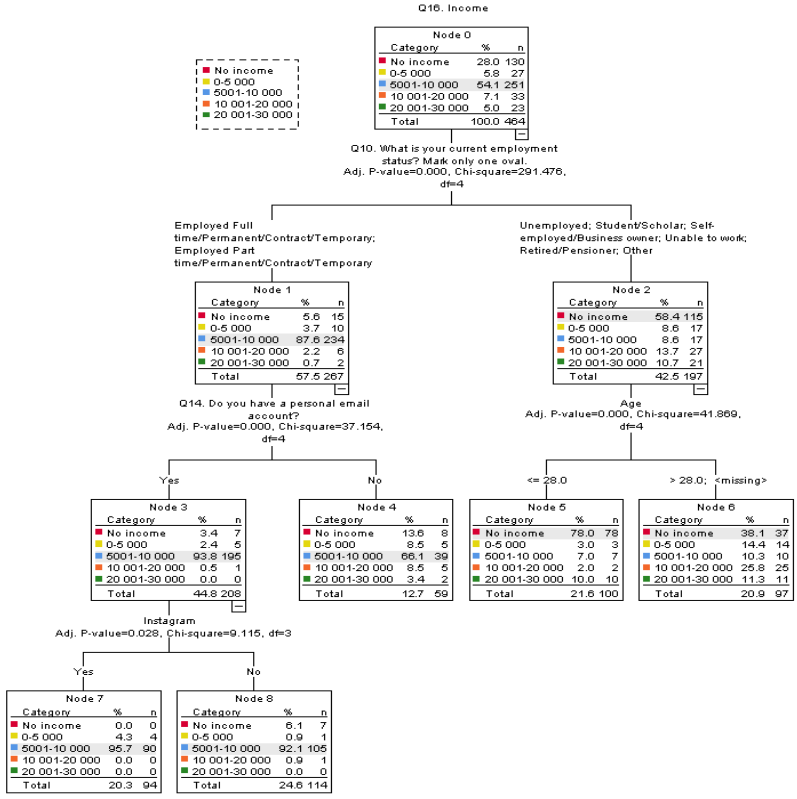

Figure 33: Decision tree of income

The decision tree of income (Figure 33) indicates that 54.1% of the respondents earn [R5001–R10 000]. The second highest category is those with no income (28%). Respondents earning [R0–R5000] represent 5.8% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 7.1% and 5.0%, respectively, of the total sample. According to the tree, the strongest predictor of income in the Western Cape is the employment status as it has the highest Chi-square (291.476) with the lowest p-value (.000). The results indicate that 167 out of 484 respondents (57.5%) are employed from which a large majority (87.6%) earn [R5001–R10 000] and 197 out of 484 are unemployed from which majority people have no income (68.4%).

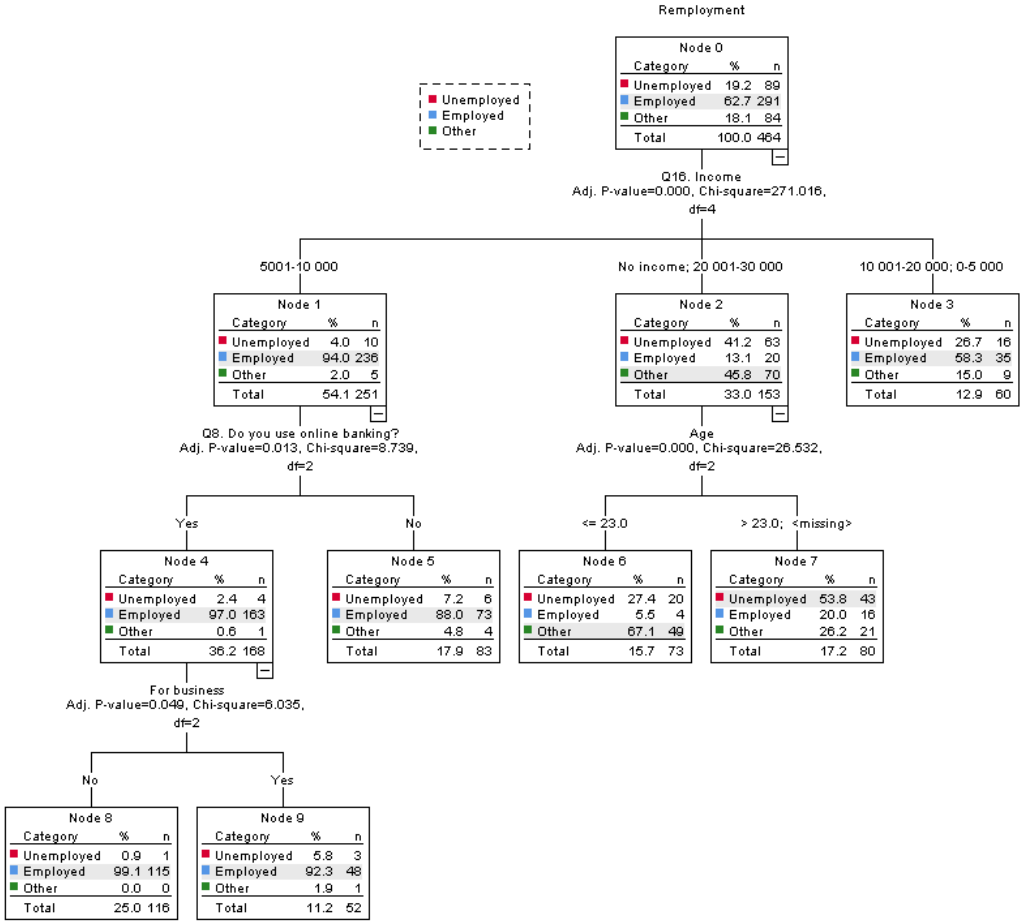

Figure 34: Decision tree of employment status

Those in the second category (unemployed, student/scholar, self-employed/business owner) who are younger than 28years are also most likely to

have no income (78%), compared with those who are older than 28 years old (38.1%). Note that 93.8% of those who are employed and who have an email address are more likely to earn [R5001–R10 000], compared with those with no email account (66.1%). Those who have an email address and use the internet for Instagram (95.7%) are most likely to earn [R5001–R10 000], compared with those who have an email address but do not use Instagram (92.1%). In conclusion, the dominant personal income range in the Western Cape is [R5001–R10 000]. The personal income level in this province is primarily determined by four main factors, namely: employment status (1), having an email address (2), age group (3) and using Instagram (4).

The decision tree of employment status (Figure 34) indicates that 62.7% of the respondents are employed in the Western Cape, that is, 291 out of 464 people. According to the tree, the strongest predictor of employment status in the Western Cape is income because it has the highest chi-square (271.016) with the lowest p-value (.000). The results indicate that respondents with an income range of [R500–R10 000] are most likely to be employed (94%), compared with those who have no income or earn [R20 000–R30 000] (13.1%). The same conclusion applies to those who earn [R0–R5000 and R10 000–R20 000] (58.3%). Those who earn [R5001–R10 000] and who use online banking are most likely to be employed (97.0%), compared with those with the same level of income but do not use online banking (88%). In addition, those who use the internet for business are most likely to be employed (99.1%), compared with those who do not use the internet for business (92.3%). On the other hand, participants who are older than 23 with no income or who earn [R20 001–R30 000] (53.8%) are most likely to be unemployed, compared with those in the same income group but aged 23 years old or younger (5.5%). In conclusion, most respondents in the Western Cape are employed. Four factors were found to predict their employment status, namely: personal income (1), using the internet for business (2), using online banking (3) and age group (4).

The decision tree of social inclusion (Figure 35) indicates that 56.9% of the respondents in the Western Cape feel socially excluded, that is, 264 out of 464 people. According to the tree, the strongest predictor of social inclusion in the Western Cape is the feeling of economic inclusion because it has the highest chi-square (69.624) with the lowest p-value (.000). The results indicate that respondents who feel more included in the economy (76.5%) are most likely to feel socially included. Those who do not feel more included in the economy and do not pay their bills are also more likely to feel socially excluded (70.6%), compared with those who do not feel more included in the economy but do not pay their bills (55.0%). In addition, those who do not use YouTube are most likely to feel socially excluded (77.6%), compared with those with the use YouTube (62.4%). In conclusion, most respondents in the Western Cape feel excluded from the society. Three factors were found to predict their feeling of

social inclusion, namely: feeling more included in the economy (1), paying bills (2) and using YouTube (3).

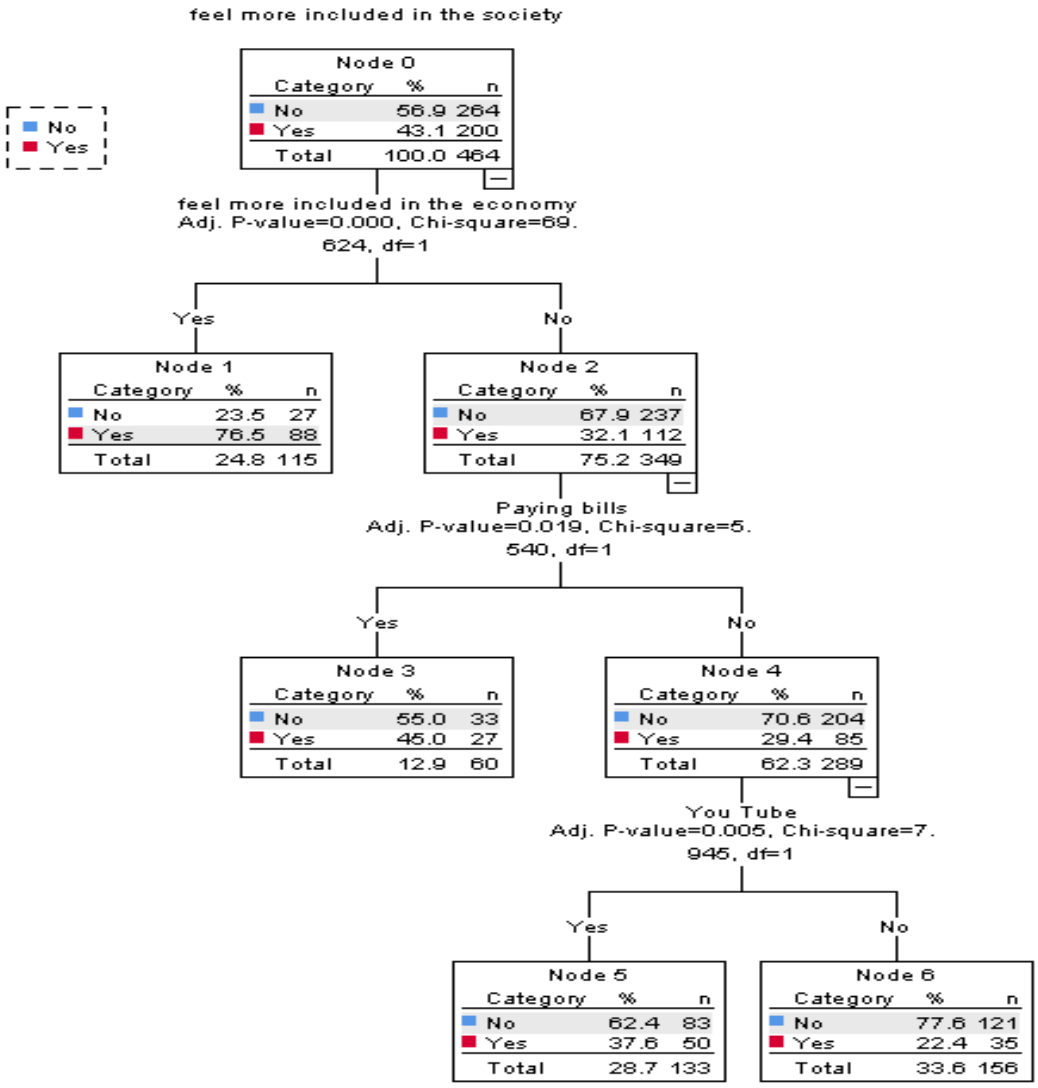

Figure 35: Decision tree of social inclusion

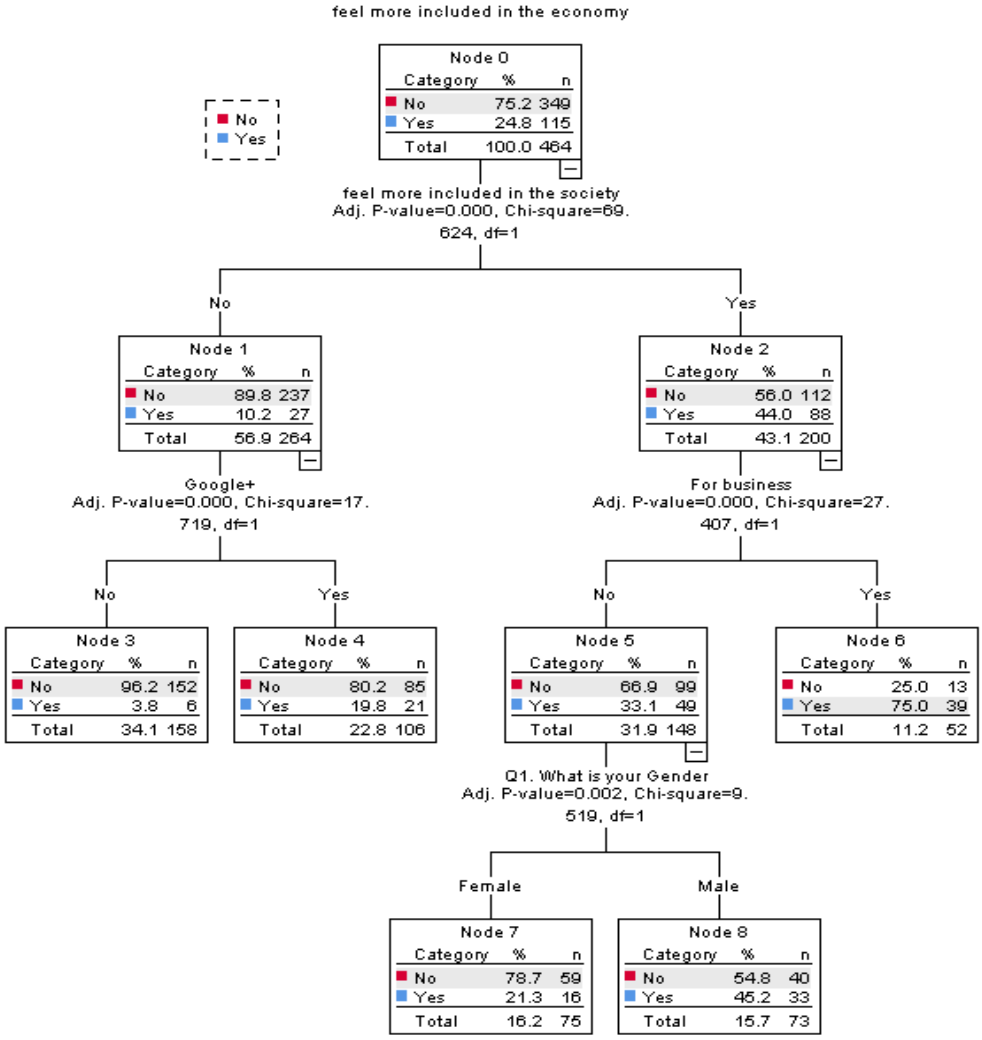

Figure 36: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 36) indicates that 75.2% of the respondents in the Western Cape do not feel included in the economy, that is, 349 out of 464 people. According to the tree, the strongest predictor of economic inclusion in the Western Cape is the feeling of social inclusion because it has the highest chi-square (69.624) with the lowest p-value (.000). The results indicate that respondents who do not feel more included in the society (89.8%) are most likely to feel excluded from the economy. In addition, people who do not feel more included in the society and do not use Google (96.2%) account are most

likely to feel excluded from the economy, compared with those who do not feel more included in the society but use a Google account (80.2%). On the other hand, those who feel more included in the society and who use the internet for business are most likely to feel included in the economy (75%), compared with those who feel more included in the society but do not use the internet for business (33.1%). However, females who feel more included in the society but do not use the internet for business (78.7%) are less like to feel included in the economy, compared with males with the same characteristics (54.7%). In conclusion, most respondents in the Western Cape do not feel more included in the economy. Four factors were found to predict the feeling of economic inclusion in the province, namely: feeling more included in the society (1), using the internet for business (2), using a Google account (3) and gender (4).

Appendix B: Decision Tree Analyses (Population Settlements)

Introduction

This report presents the decision tree analysis of the four areas considered in the study, namely: (1) peri-urban, (2) rural, (3) township and (4) urban. The decision tree model was used to determine the predictors (profile) of income, employment status, social inclusion and economic inclusion across these four areas. The non-normality of the data was not an issue given the large sample sizes exceeding 167.[13]

1. Peri-Urban Areas

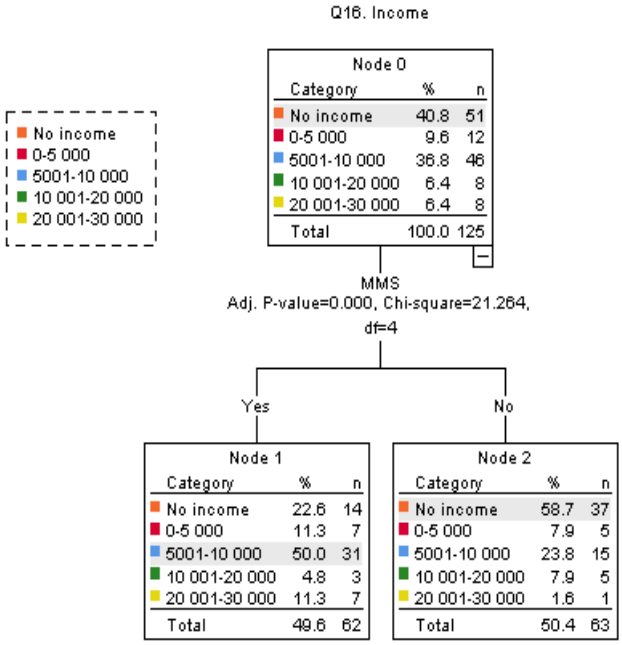

Figure 1: Decision tree of income

[13] Field, A. *Discovering Statistics Using IBM SPSS Statistics* (Thousand Oaks: Sage, 2013), 173.

The decision tree of income (Figure 1) indicates that 51 out of 125 respondents (40.8%) have no income. This is followed by respondents who earn [R5001–R10 000] (36.8%). Respondents who earn [R0–R5000] represent (9.6%) of the sample. Lastly, respondents who earn [R10 001–R20 000] and [R20 001–R30 000] represent 6.4% each. The tree shows that MMS is the strongest predictor of income in peri-urban areas because it has the highest Chi-square (21,264) and the lowest p-value (0.000). The results illustrate that respondents who do not use MMS on their devices are most likely to be those with no income (58.7%). Those who use MMS on their devices are more likely to earn [R5001–R10 000] (50%). In conclusion, most respondents in peri-urban areas do not have an income. MMS usage on the device was found to be a significant predictor of personal income.

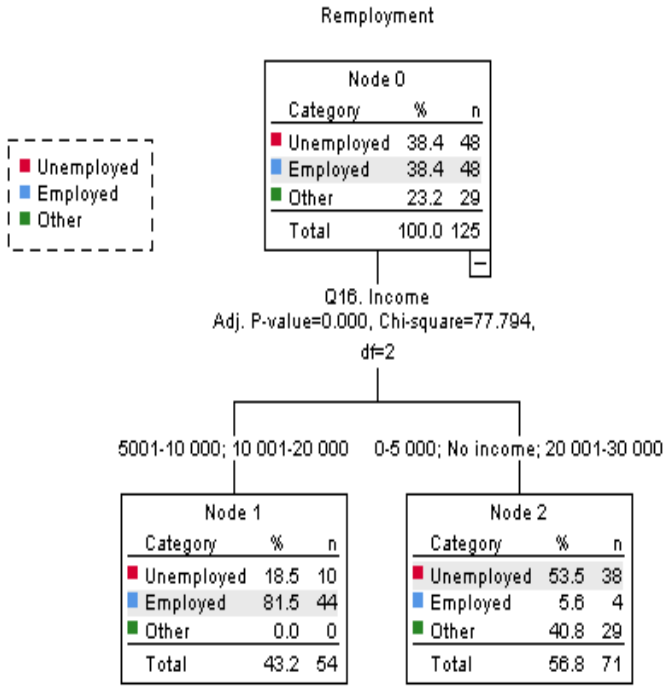

Figure 2: Decision tree of employment status

The decision tree of employment status (Figure 2) indicates that unemployed and employed respondents represent (38.4%) each. Respondents who fall within the other category (unable to work; retired) represent 23.2% of the sample.

Income is the strongest predictor of employment status in peri-urban areas as it has the highest Chi-square (77.794) and the lowest p-value (.000). According to decision tree above, respondents who earn [R5001–R20 000] (81.5%) are most likely to be employed, compared with the other income ranges. In conclusion, unemployed respondents are equal to employed respondents in peri-urban areas. Income was found to predict their employment status.

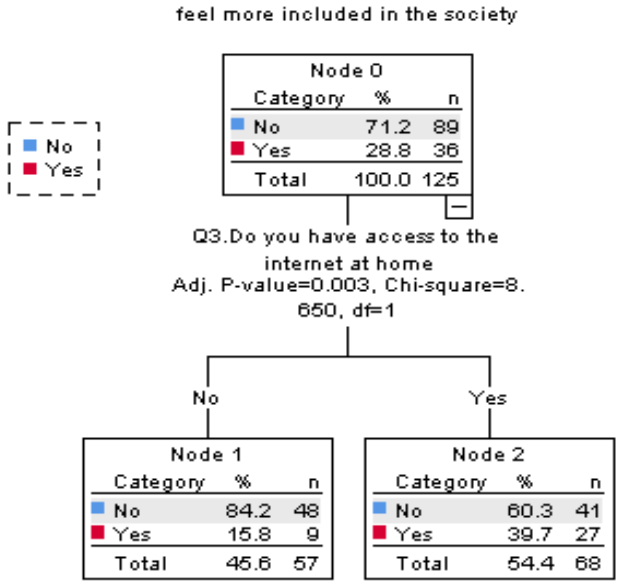

Figure 3: Decision tree of social inclusion

The decision tree of social inclusion (Figure 3) indicates that 71.2% of the respondents in peri-urban areas do not feel included in the society and only 28.8% feel more incuded in the society. Access to the internet at home is the the strongest predictor of social inclusion in peri-urban areas because it has the highest chi-square (8.650) and the lowest p-value (0.003). Results show that respondents who do not have access to the internet at home (84%) are more likely to feel socially excluded, compared with those who have access to the internet at home (60.3%). In conclusion, most respondents in peri-urban areas reported to feel excluded from the society. Access to the internet at home was found to be a predicting factor of social inclusion. Respondents who do not have access to the internet at home are most likely to feel socially excluded, compared with those who have internet access.

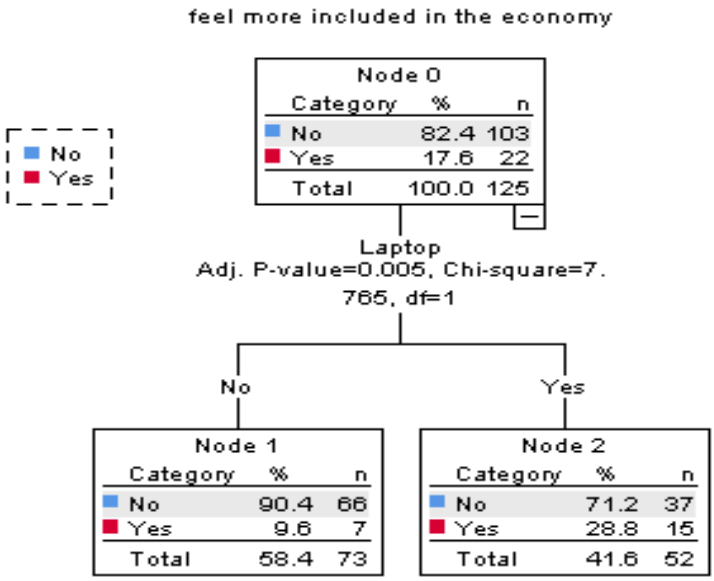

Figure 4: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 4) indicates that 82.4% of the respondents in peri-urban areas do not feel economically included and only 17.6% feel economically incuded. According to the tree, owning a laptop is the strongest predictor of economic inclusion in peri-urban areas becuase it has the highest Chi-square of (7.765) and the lowest p-value of (0.005). The results illustrate that respondents who do not have laptops (90.4%) are most likely to feel economically excluded, compared with those who own laptops (71.2%). In conclusion, most respondents in peri-urban areas report feeling economically excluded. Owning a laptop was found to be an important determinant of economic inclusion. Respondents who do not own laptops are most likely to feel economically excluded than those who own them.

2. Rural Areas

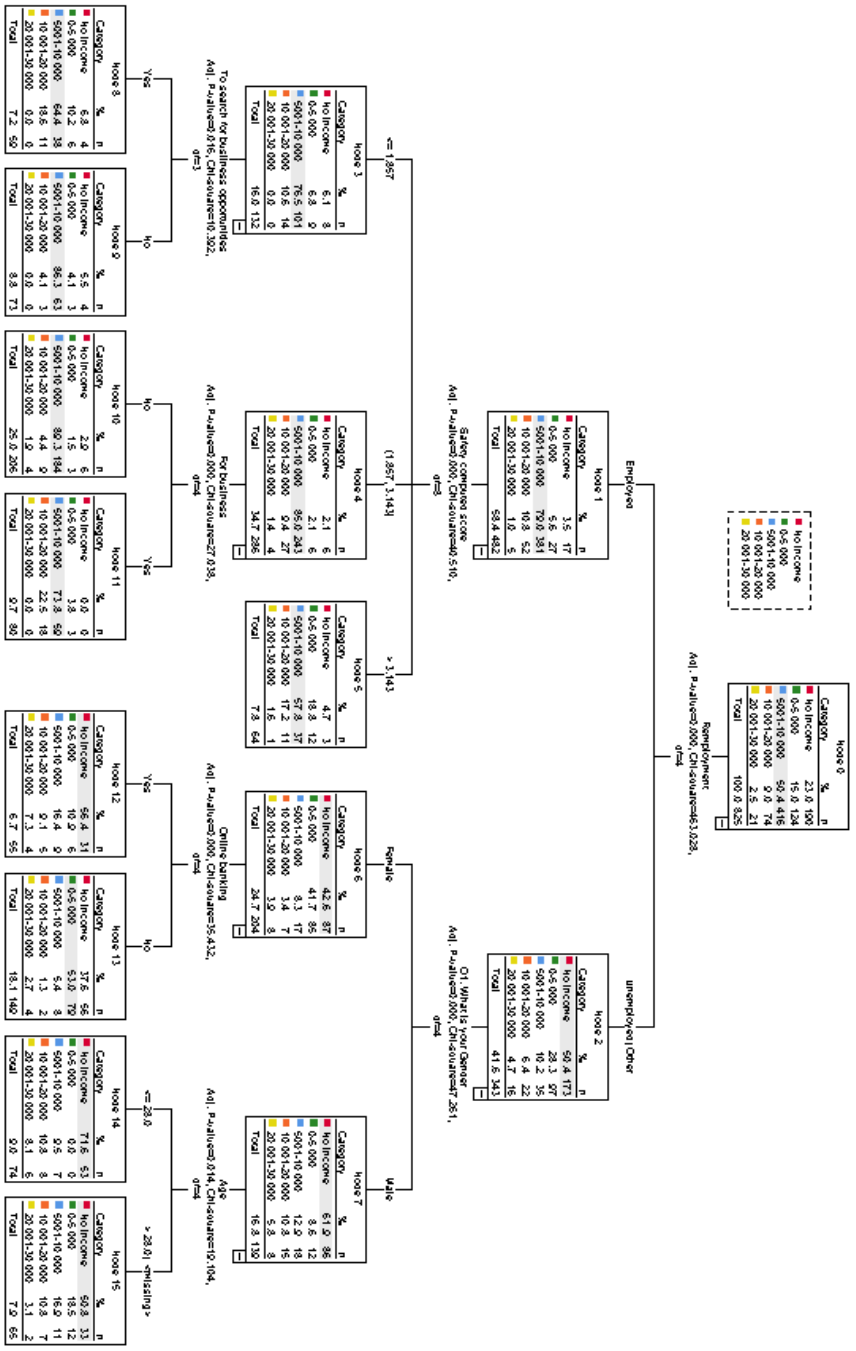

Figure 5: Decision tree of income

Figure 5 illustrates the decision tree of income for rural areas. Most respondents earn [R5001–R10 000] (50.4%). The second highest category is no income (23.0%). Respondents earning [R0–R5000 represent 15.0% of the sample. Finally, those earning [R10 001–R20 000] and [R20 001–R30 000] only represent 9% and 2.5%, respectively, of the total sample.

According to the tree, the strongest predictor of income in rural areas is the employment status as it has the highest Chi-square (463.028) and the lowest p-value (.000). The results indicate that respondents who are employed are most likely to earn [R5001–R10 000] (79%), compared with those who are unemployed (10.2%). The majority of employed respondents whose online safety score is between 1.857 and 3.143 are most likely to earn [R5001–R10 000] (85%), compared with those whose safety score is below 1.857 and above 3.143.

Respondents whose online safety score is below 1.857 and who do not use the internet to search for business opportunities are most likely to earn [R5001–R10 000] (86.3%), compared with those who scored same online safety score and who use the internet to search for business opportunities (64.4%). Similarly, respondents whose online safety score is between 1.857 and 3.143, who do not use the internet for business are most likely to earn [R5001–R10 000] (89.3%), compared with those who scored same online safety score but who use the internet for business (73.8%).

Male respondents who are unemployed are most likely to either have no income (61.9%) or earn [R5001–R20 000]. While unemployed female respondents are most likely to either have no income (42.6%) or earn [R0–R5000] who have same employment status. Female respondents who uses online banking are most likely have no income (56.4%), compared with those who do not use online banking and who earn [R0–R5000] (53%). However, male respondents who are younger than 28 years of age are most likely to have no income (71.6%), compared with those who are older than 28 years of age (50.8%).

In conclusion, the dominant personal income range in rural areas is [R5001–R10 000]. The personal income level in rural areas is determined by seven main factors, namely: employment status (1), feeling safe when using the internet (2), gender (3), age (4), internet usage to search for business opportunities (5), internet usage for business (6) and online banking usage (7).

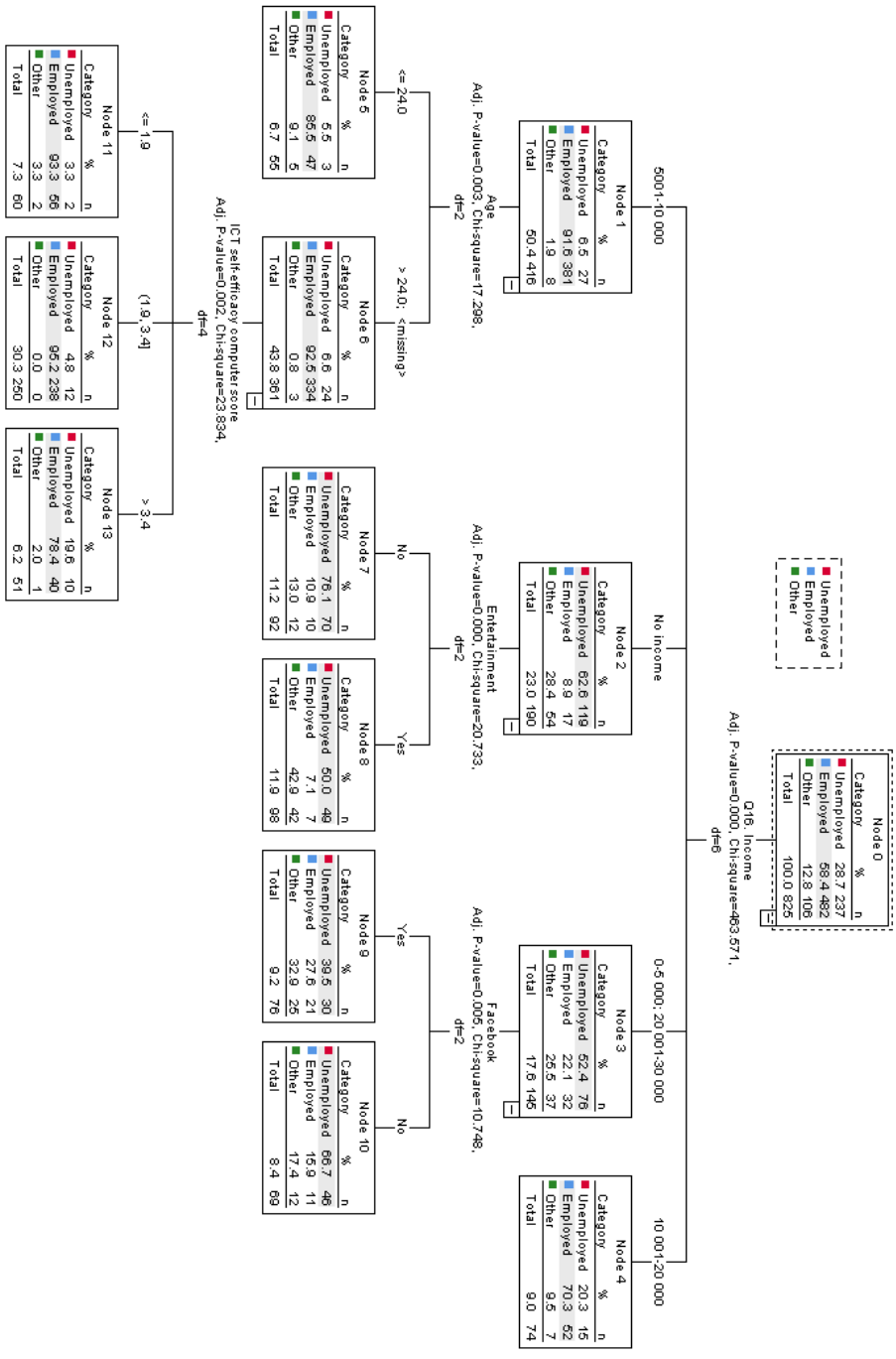

Figure 6: Decision tree of employment status

The decision tree of employment status (Figure 6) indicates that 58.4% of the respondents are employed in rural areas. Unemployed represent (28.7%). Lastly, the other category (unable to work; retired) represents 12.8%. According to the

tree, the strongest predictor of employment status in rural areas is income because it has the highest Chi-square (463.571) and the lowest p-value (.000). The results indicate that respondents with an income of [R5001–R20 000] are most likely to be employed, compared with those who earn above R20 000 or those with no income.

Respondents who earn [R5001–R10 000] and who are above age 24 (95.2%) are most likely to be employed, compared with those who earn the same amount but who are younger than 24 years old (85.5%). Respondents who are older than 24 and who have an ICT self-efficacy score between 1.9 and 3.4 (9.5.2%) are most likely to be employed, compared with those who have an ICT self-efficacy score below 1.9 and above 3.4. Respondents who have no personal income and who do not use the internet for entertainment (76.1%) are most more likely to be unemployed, compared with those who also have no income but who use the internet for entertainment (50%). Respondents who earn [R0–R5000] and [R20 000–R30 000] and who do not use the internet for Facebook (66.7%) are most likely to be unemployed, compared with those who use the internet for Facebook (39.5%).

In conclusion, most respondents in rural areas are employed. Five factors were found to predict their employment status, namely: income (1), age (2), using the internet for entertainment (3), using the internet for Facebook (4), and ICT self-efficacy score (5).

The decision tree of social inclusion (Figure 7) indicates that 55.5% respondents feel socially included while 44.5% feel socially excluded. According to the tree, the strongest predictor of social inclusion in rural areas is the first language because it has the highest Chi-square (182.247) and the lowest p-value (.000).

Above 70% of the respondents who speak Setswana, Sesotho, Sepedi and Tshivenda feel more socially excluded. while less than 60% of the respondents with first language IsiXhosa, IsiZulu, Xitsonga, Afrikaans, English, IsiNdebele and Others feel socially included. Respondents who speak IsiXhosa, IsiZulu and Xitsonga who use WhatsApp (80%) are most likely to feel socially included, compared with respondents who do not use WhatsApp (47.6%). Respondents who have WhatsApp and personal email accounts are most likely to feel socially included (85.6%), compared with those who also have WhatsApp but do not have personal email accounts (71.8%)

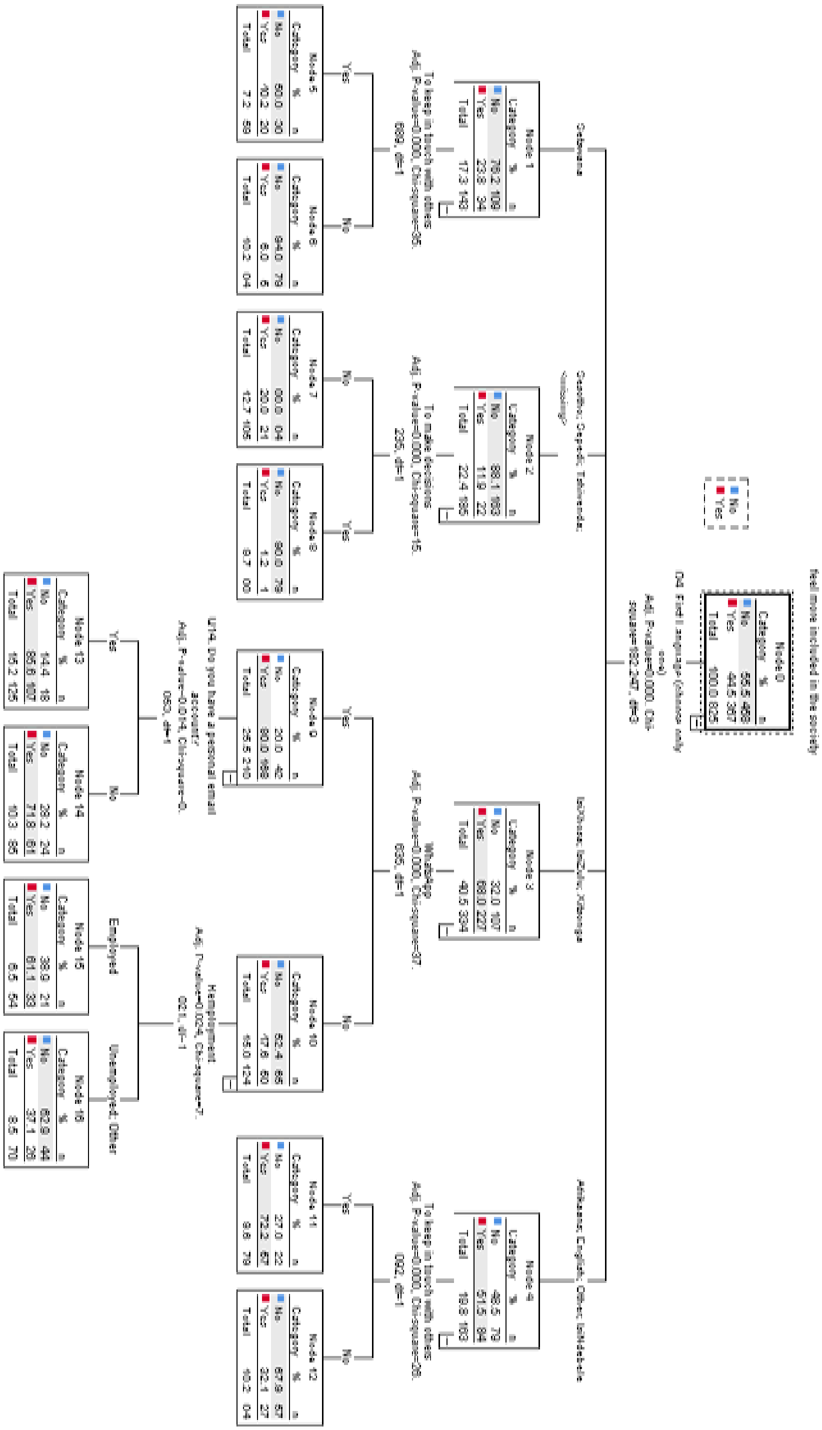

Figure 7: Decision tree of social inclusion

Respondents who speak Afrikaans, English, IsiNdebele and Others who use the internet to keep in touch with others (72.2%) are most likely to feel more socially included, compared with those who do not use the internet to keep in touch with others (67.9%). Setswana speaking respondents who do not use the internet to keep in touch with others (94%) are most likely to feel more socially excluded, compared with those who also speak Setswana and use the internet to keep in touch with others (50.8%). Respondents who speak [Sesotho, Sepedi and Tshivenda] and who use the internet to make decisions are most likely to feel socially excluded (98.8%), compared with those who do not use the internet to make decisions (80%).

In conclusion, more respondents in rural areas feel socially excluded. Six factors were found to predict their feeling of social inclusion, namely: first language (1), using the internet to keep in touch with others (2), using the internet to make decisions (3), using WhatsApp (4), having a personal email account (5) and employment status (6).

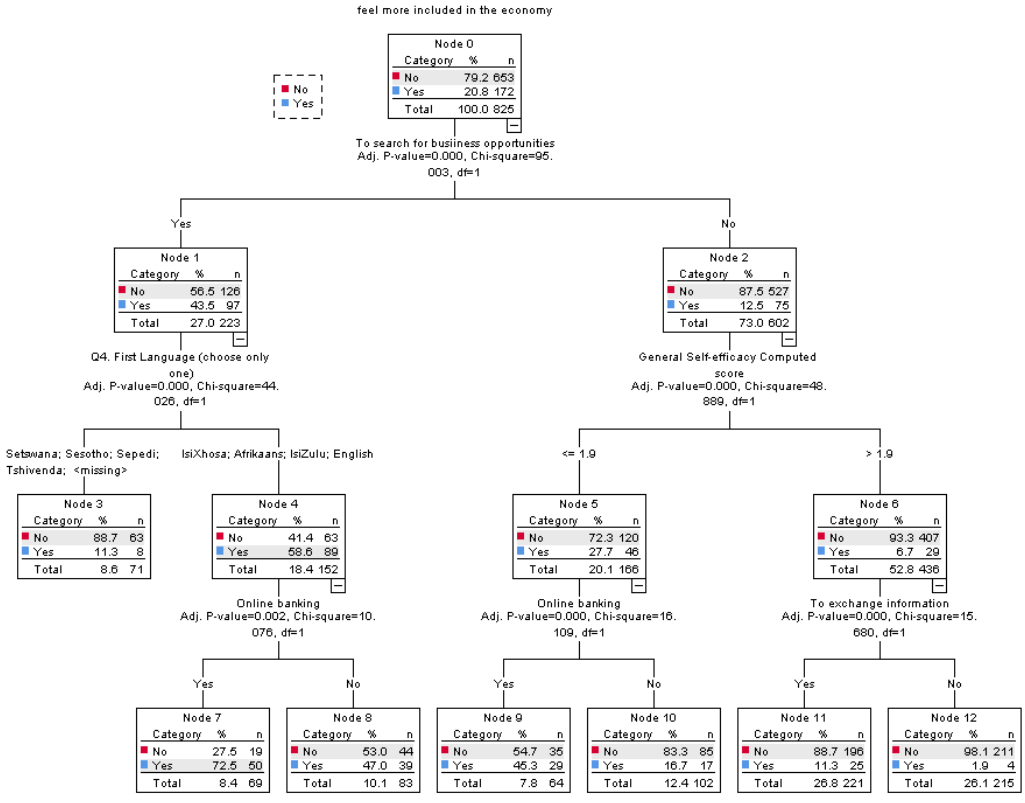

Figure 8: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 8) indicates that 79.2% respondents feel economically excluded while only 20.8 % feel economically included. According to the tree, the strongest predictor of economic inclusion in rural areas is usage of the internet to search for business opportunities because it has the highest Chi-square (95,003) and the lowest p-value (.000).

The results illustrate that most respondents who do not search for business opportunities feel more economically excluded (87.5%), compared with those who search for business opportunities (56.5%). However, respondents who search for business opportunities and who speak Setswana, Sesotho and Sepedi (88,7%) are most likely to feel economically excluded, compared with those who speak IsiXhosa, Afrikaans, IsiZulu and English (58.6%). Respondents who speak isiXhosa, Afrikaans, isiZulu, and English who use online banking (72.5%) are most likely to feel economically included, compared with those who do not use online banking (47%).

Respondents who do not search for business opportunities and whose general self-efficacy score is above 1.9 (93.3%) are most likely to feel more economically excluded, compared with those whose general self-efficacy score below 1.9 (72.3%). Respondents whose general self-efficacy is above 1.9, who do not use the internet to exchange information (98.1%) are most likely to feel more economically excluded, compared with those whose general self-efficacy is also above 1.9 but who use the internet to exchange information (88.7%). Respondents whose general self-efficacy score is below 1.9 and who do not use online banking (83.3%) are most likely to feel economically excluded, compared with those who have same scores and who uses online banking (54.7%).

In conclusion, more respondents in rural areas report feeling more economically excluded. Five factors were found to predict their feeling of social inclusion, namely: use of the internet to search for business opportunities (1), first language (2), general self-efficacy computed score (3), online banking (4) and use of the internet to exchange information.

3. Township Areas

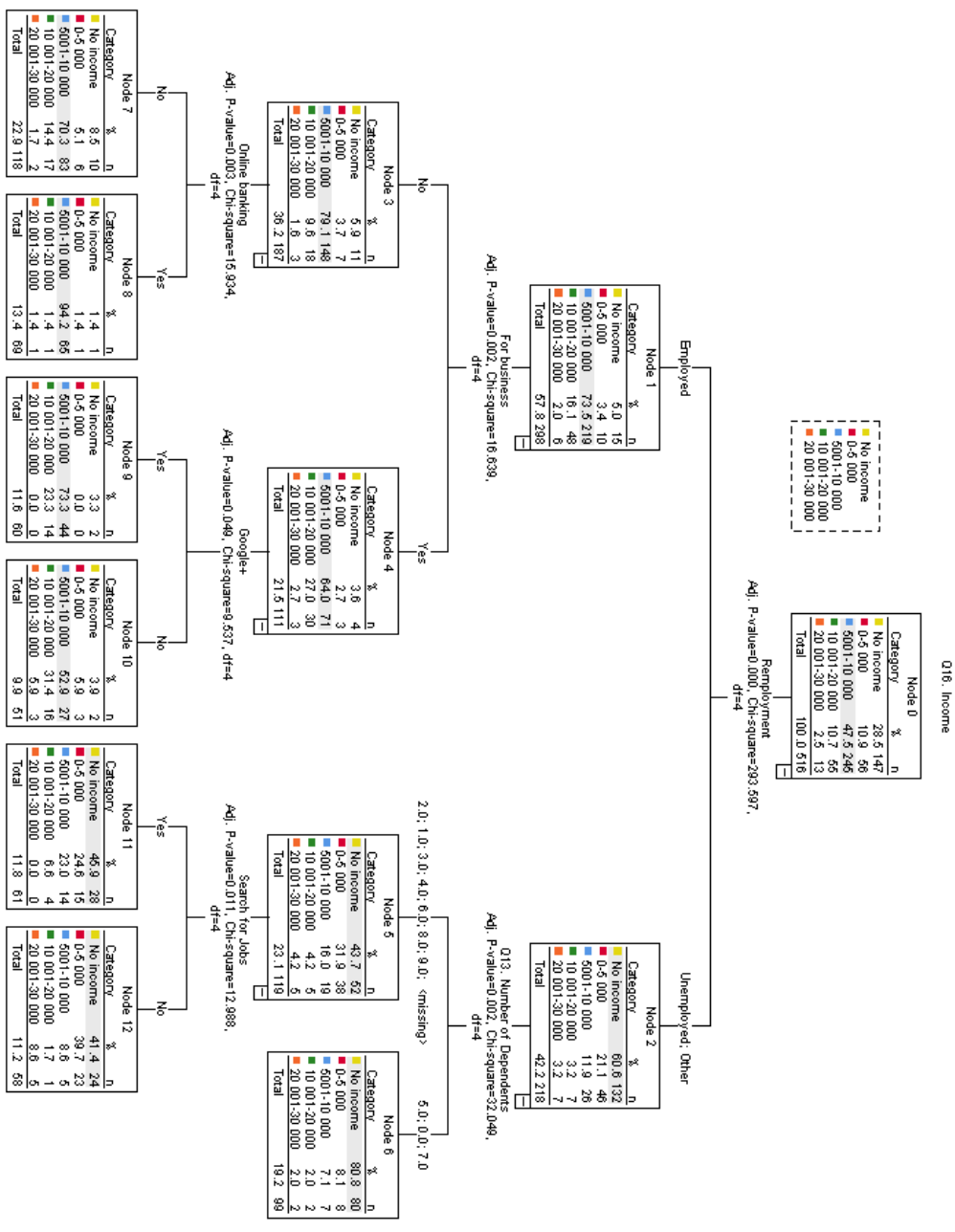

Figure 9: Decision tree of income

Figure 9 illustrates the decision tree of income for township areas. Most respondents earn [R5001–R10 000] (47.5%). The second highest category is no

income (28.5%). Respondents earning [R0–R5000] represent (10.9%) of the sample. Finally, those who earn [R10 001–R20 000] and [R20 001–R30 000] only represent 10.7% and 2.5%, respectively, of the total sample.

According to the tree, the strongest predictor of income in township areas is employment status because it has the highest Chi-square (293,597) and the lowest p-value (.000). The results indicate that employed respondents are most likely to earn [R5001–R10 000] (73.5%), compared with those who are unemployed and who fall within the other category (11.9%). Employed respondents who do not use the internet for business (79.1%) are more likely to earn [R5001–R10 000], compared with those who are also employed but who use the internet for business (64%).

Respondents who do not use the internet for business but use online banking are more likely to earn [R5001–R10 000] (94.2%), compared with those who do not use the internet for business but use online banking (70.3%). Respondents who use the internet for business and who use Google are most likely to earn [R5001–R 10 000] (73.3%), compared with those who use the internet for business but do not use Google (52.9%).

Respondents who have [5.0; 0.0; 7.0] number of dependents (80.8%) are most likely to have no income, compared with those who have [2.0; 1.0; 3.0; 4.0; 6.0; 8.0; 9.0] number of dependents (43.7%). The tree also illustrates that respondents who have [2.0; 1.0; 3.0; 4.0; 6.0; 8.0; 9.0] number of dependents and who use the internet to search for jobs (45.9%) are most likely to have no income, compared with those who search for jobs on the internet (41.4%).

In conclusion, the dominant personal income range in township areas is [R5001–R10 000]. The personal income level in township areas is determined by six main factors, namely: employment status (1), internet usage for business (2), number of dependents (3), Google usage (4), internet usage to search for jobs (5), and online banking usage (6).

The decision tree of employment status (Figure 10) indicates that 57.8% respondents are employed in township areas. The second highest category is unemployed (31.8%). Lastly, 10.5% represent the other category.

According to the tree, the strongest predictor of employment status in township areas is income because it has the highest chi-square (295.660) and the lowest p-value (.000). Respondents who earn [R5001–R10 000] and [R10 001–R20 000] (89%) are most likely to be employed, compared with those who have no income (70.1%) and those who earn [R0–R5000]; [R10 001–R20 000] and [R20 001–R30 000] (50.7%).

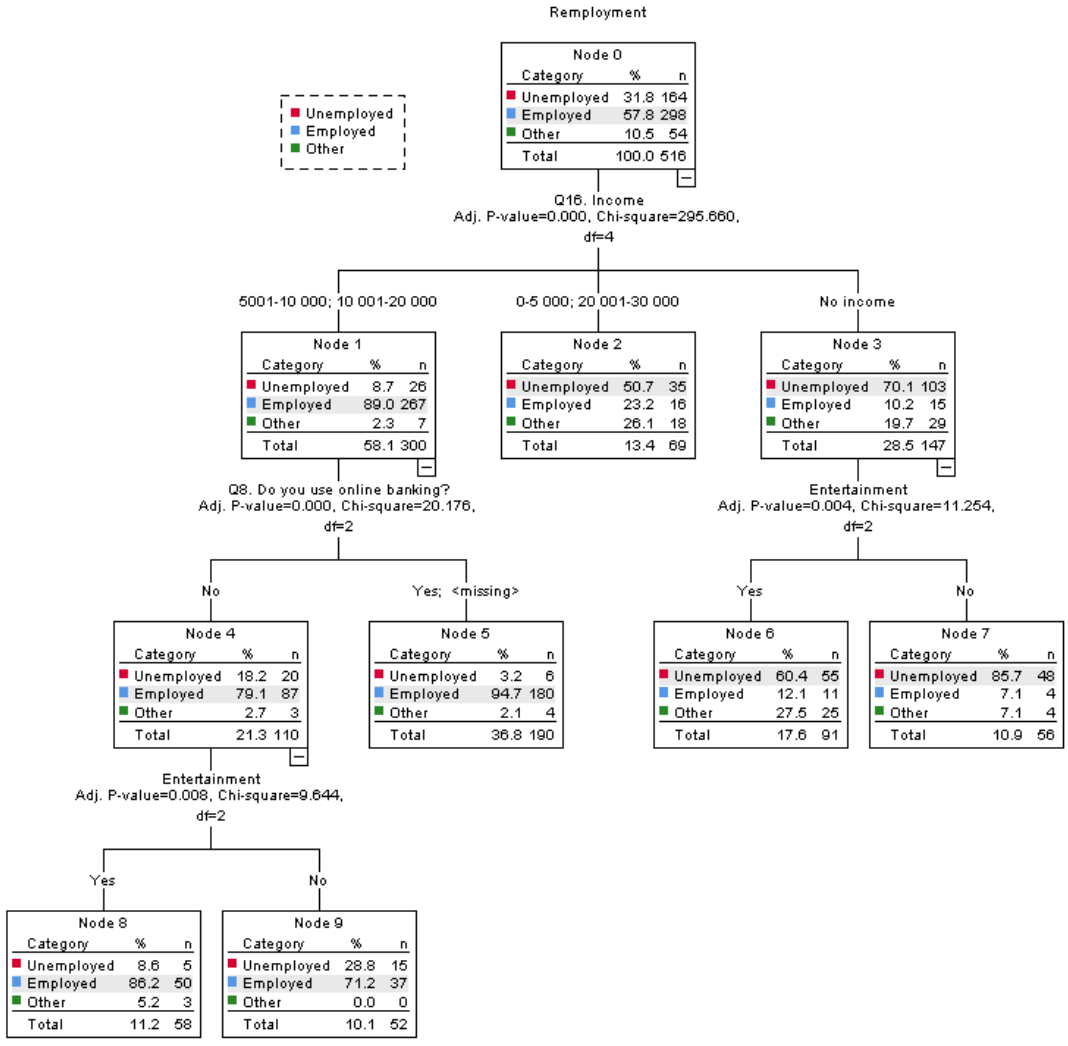

Figure 10: Decision tree of employment status

Respondents who earn [R5001–R10 000] and who use online banking (94.7%) are most likely to be employed, compared with those who earn same amount but who do not use online banking (79.1%). However, respondents who do not use online banking but who use the internet for entertainment (86.2%) are most likely to be employed, compared with those who do not use the internet for entertainment and online banking (71.2%). Respondents who have no income and who do not use the internet for entertainment (85.7%) are most likely to be unemployed, compared with those who use the internet for entertainment (60.4%).

In conclusion, most respondents in township areas are employed. Three factors were found to predict their employment status, namely: monthly household income (1), whether they have online banking (2) and using the internet for entertainment (3).

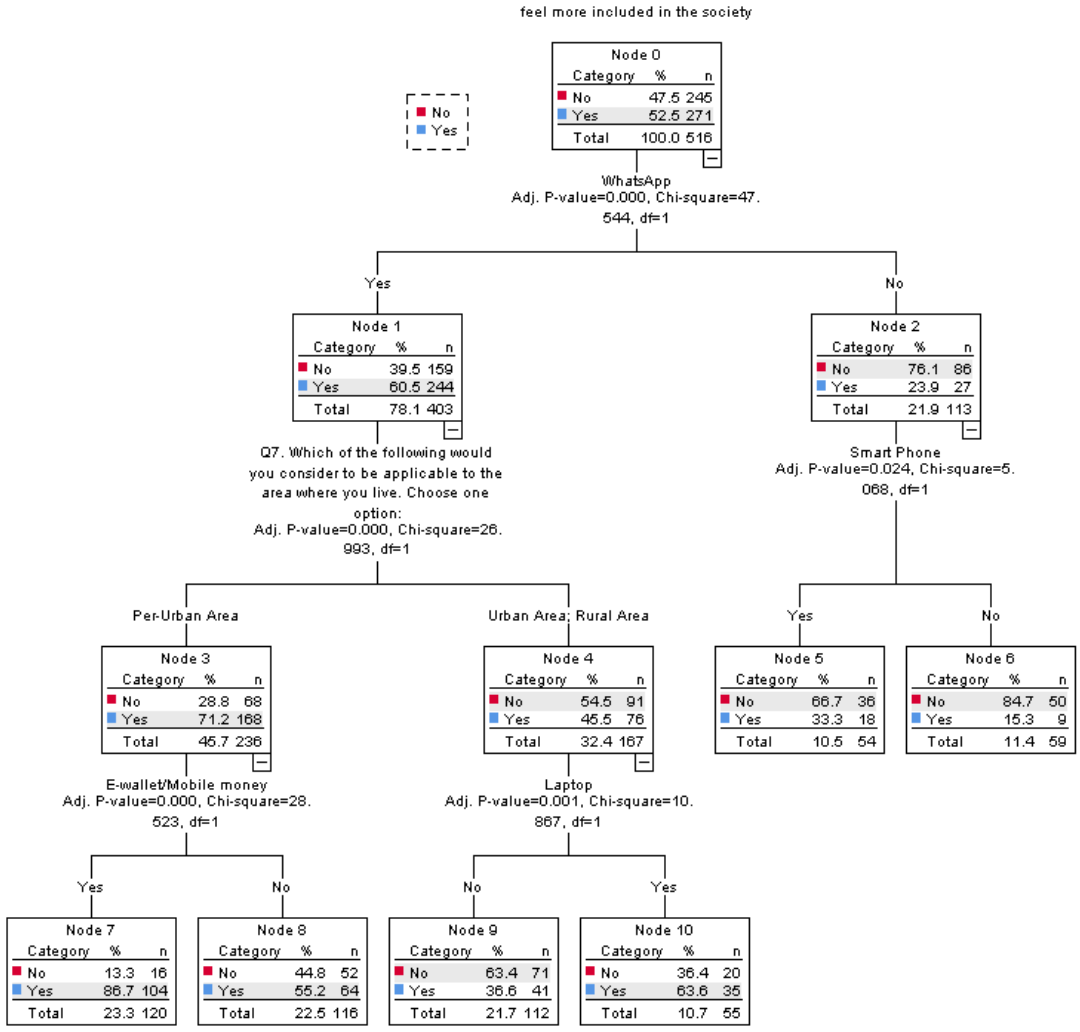

Figure 11: Decision tree of social inclusion

The decision tree of social inclusion (Figure 11) indicates that 52.5% of the respondents feel socially included and 44.5% feel socially excluded. According to the tree, the strongest predictor of social inclusion in township areas is the usage

of WhatsApp because it has the highest Chi-square (47,544) and the lowest p-value (.000). Respondents who do not use WhatsApp (76.1%) are most likely to feel socially excluded, compared with those who use WhatsApp (39.5%).

Respondents who use WhatsApp and who live in peri-urban areas (71.2%) are most likely to feel more socially included, compared with those who use WhatsApp and who live is urban and rural areas (45.5%). In addition, respondents who live in peri-urban areas and who use e-wallet/mobile money transfer (86.7%) are most likely to feel socially included, compared with those who live in urban and rural areas and who do not use e-wallet/mobile money transfer (55.2%). However, respondents who live in urban or rural areas and who own laptop (63.6%) are most likely to feel socially included, compared with those who do not own laptops (36.6%). Lastly, respondents who do not use both WhatsApp and smart phones (84.7%) are most likely to feel more socially excluded, compared with those who also do not have WhatsApp but who use smartphone (66.7%).

In conclusion, more respondents in township areas report feeling more socially included. Five factors were found to predict their feeling of social inclusion, namely: WhatsApp usage (1), applicable area where they live (2), Smartphone usage (3), e-wallet/money transfer usage (4), and laptop usage (5).

The decision tree of economic inclusion (Figure 12) indicates that 69.6% of the respondents feel economically excluded while 30.4 % feel economically included. According to the tree, the strongest predictor of economic inclusion in township areas is the usage of online banking because it has the highest chi-square (59,377) and the lowest p-value (.000). Respondents who do not use online banking (81.5%) are most likely to feel economically excluded, compared with those who uses online banking and who are likely feel economically included (50.8%).

Respondents who do not use online banking and who use the internet to keep in touch with others (88.7%) are most likely to feel more economically excluded, compared with those who do not use online banking but who use the internet to keep in touch with others (66.3%). However, respondents who use the internet to keep in touch with others and who do not have personal email (78%) are most likely to feel more economically excluded, compared with those who use the internet to keep in touch with others but do not have personal email (55.6%). Respondents who do not use the internet to keep in touch with others and for social interactions with family/friends (95.9%) are most likely to feel economically excluded than respondents who also do not use the internet to keep in touch with others but use it for social interactions with family/friends (83.1%).

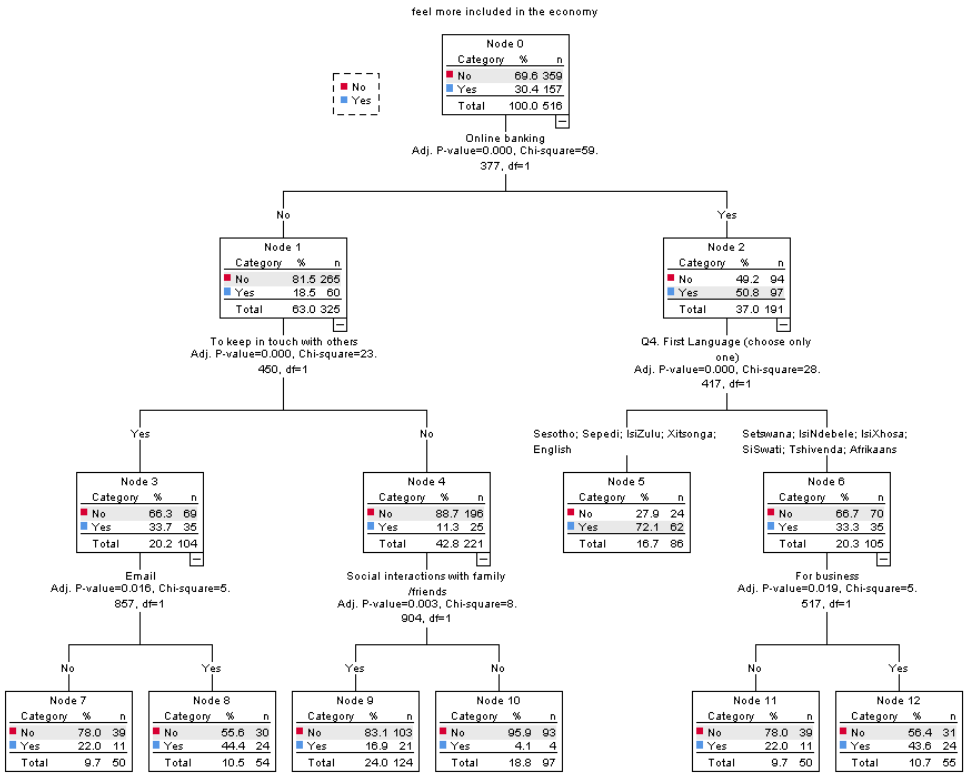

Figure 12: Decision tree of economic inclusion

Respondents who use online banking and who speak Sesotho, Sepedi, isiZulu, Xitsonga and English (72.1%) are most likely to feel economically included, compared with those who also do not use online banking and speak Setswana, isiNdebele, isiXhosa, siSwati, Tshivenda and Afrikaans (33.3%). Respondents who speak Setswana, isiNdebele, isiXhosa, siSwati, Tshivenda and Afrikaans and who do not use the internet for business (78%) are most likely to feel more economically excluded than respondents who speak the same languages but who use the internet for business (56.4%).

In conclusion, most respondents in township areas report feeling more economically excluded. Six factors were found to predict their feeling of social inclusion, namely: online banking (1), internet usage to keep in touch with others (2), first language (3), email (4), internet usage for business (5) and social interaction with family (6).

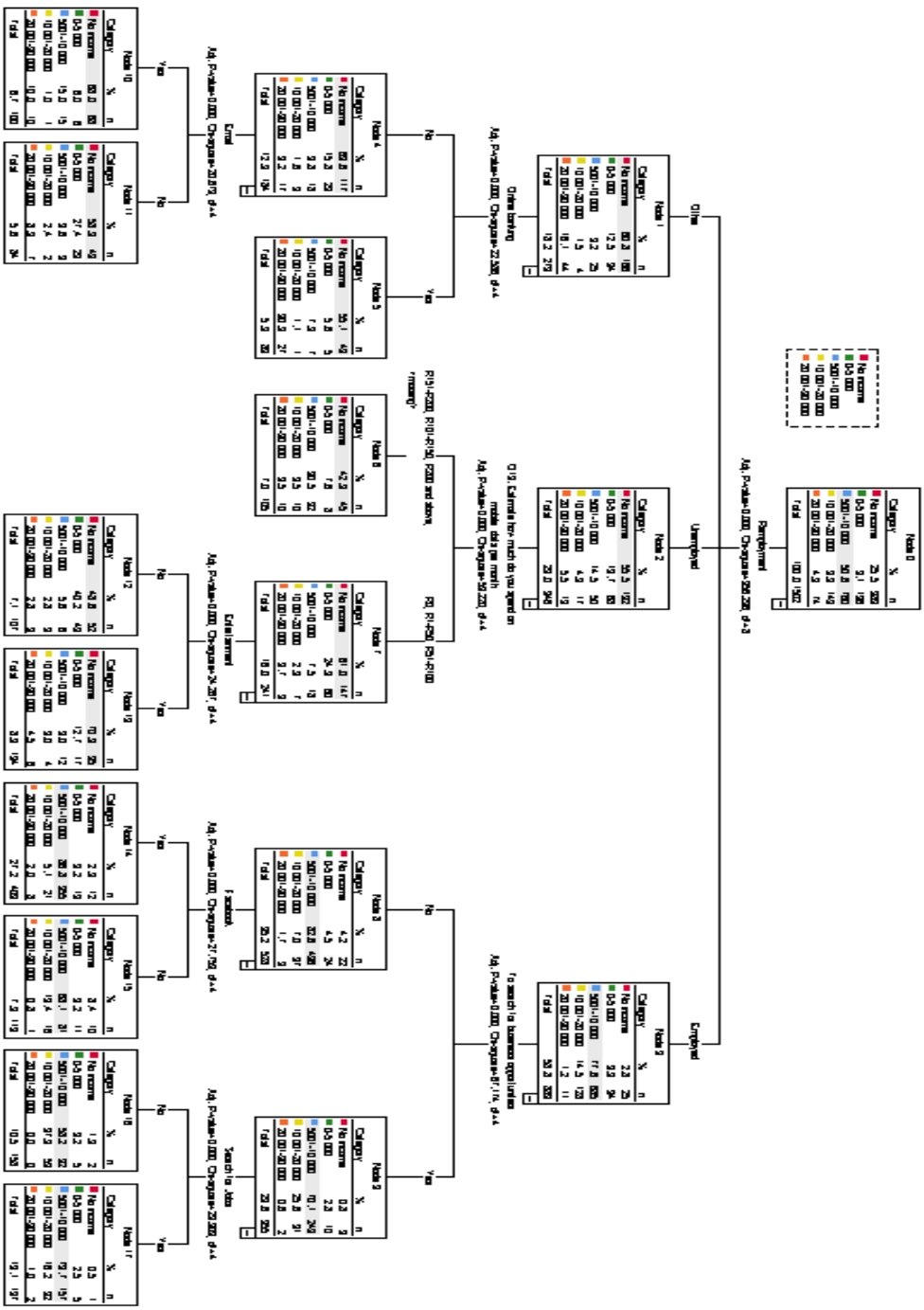

Figure 13: Decision tree of income

4 Urban Areas

The decision tree of income (Figure 13) indicates that 50.6% of the respondents earn [R5001–R10 000]. The second highest category is no income (25.5%). Respondents who earn [R0-R 5000] represent 9.1% of the sample. Finally, those who earn [R10 001–R20 000] and [R20 001–R30 000] only represent 9.9% and 4.9%, respectively, of the total sample.

According to the tree, the strongest predictor of income in urban areas is employment status because it has the highest Chi-square (956.236) and the lowest p-value (.000). The results indicate that respondents who are employed are most likely to earn [R5001–R10 000] (77.6%), compared with those who are in the other category and those who are unemployed. Respondents who are in the other category who do not use online banking are most likely to have no income (63.6%), compared with those who use online banking (55.1%). Respondents who do not use online banking but who have personal email accounts are most likely to have no income (68%), compared with those who do not have personal email accounts (58.3%).

Respondents who are unemployed and who spend less than R100 on mobile data per month are most likely to have no income (61%), compared with those who spend above R100 on mobile data per month (42.9%). Respondents who spend less than R100 on mobile data per month and who use the internet for entertainment are most likely to have no income (70.9%), compared with those who also spend less than R100 on mobile data per month but who do not use the internet for entertainment (48.6%).

Respondents who are employed and who do not use the internet to search for business opportunities are most likely to earn [R5001–R10 000] (82.6%), compared with those who do not use the internet to search for business opportunities (70.1%). Respondents who do not use the internet to search for business opportunities and who use Facebook are most likely to earn [R5001–R10 000] (86.8%), compared with those who do not use the internet to search for business opportunities and Facebook (68.1%). Respondents who use the internet to search for business opportunities and jobs are most likely to earn [R5001–R10 000] (79.7%), compared with those who also use the internet to search for business opportunities but who do not use it to search jobs (58.2%).

In conclusion, the dominant personal income range in urban areas is [R5001–R10 000]. The personal income level in this province is determined by eight main factors, namely: employment status (1), Facebook (2), using the internet to search for job (3), using the internet to search for business opportunities (4), personal email account ownership (5), online banking (6), expenditure on mobile data per month (7) and using the internet for entertainment (8).

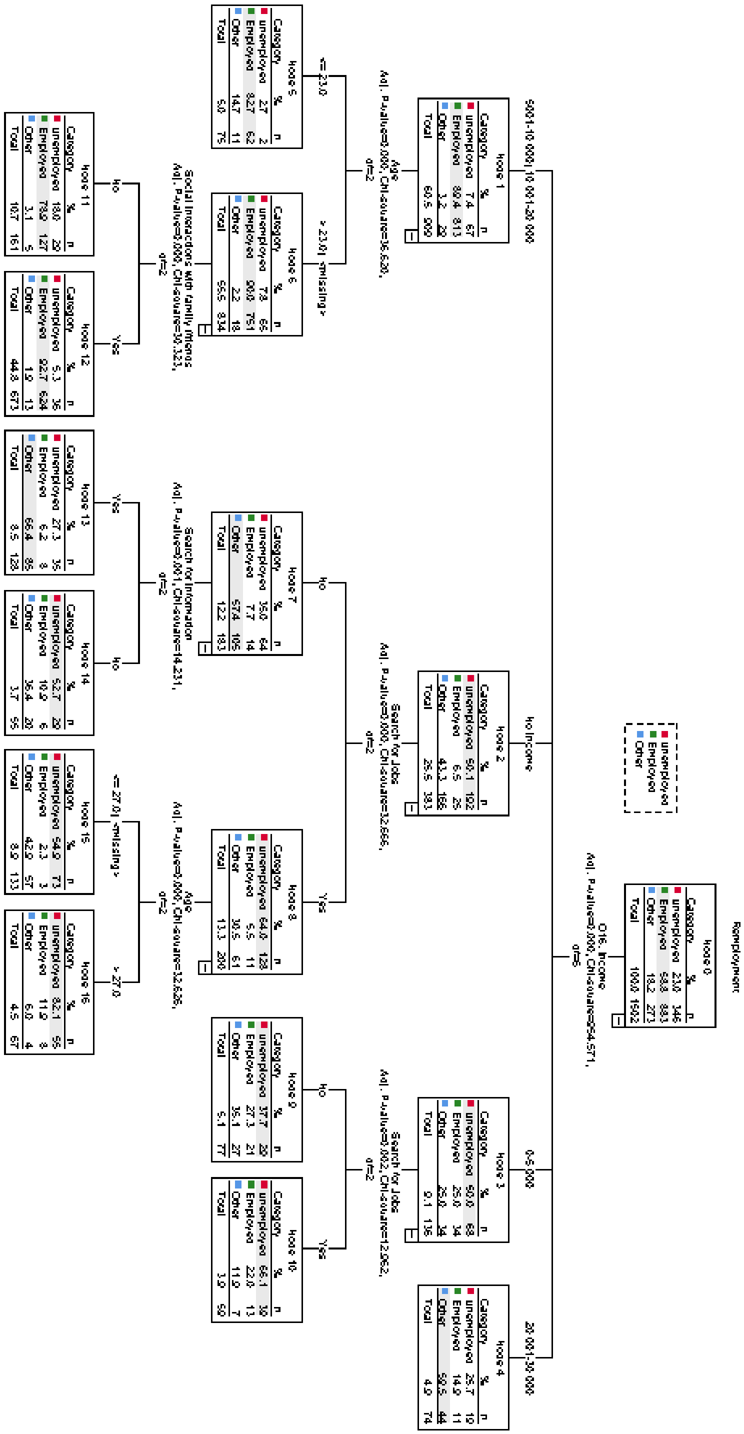

Figure 14: Decision tree of employment status

The decision tree of employment status (Figure 14) indicates that 58.8% of the respondents are employed in urban areas. Unemployed represent 23% and the other category represent 18.2%. According to the tree, the strongest predictor of employment status in urban areas is income because it has the highest Chi-square (954.571) and the lowest p-value (.000). The results indicate that respondents who earn [R5001–R20 000] (89.4%) are most likely to be employed, compared with those who have no income (50.1%) and those earn [R0–R5000] (50%) who are most likely to be unemployed. Note that respondents who earn above R20 000 are likely to fall within the other category (59.5%).

Respondents who earn [R5001–R20 000] and who are older than 23 years of age (90%) are most likely to be employed, compared with those who earn same amount and who are younger than 23 years of age (78.9%). Respondents who are older than 23 years of age, who use online forums to socially interact with family and friends are most likely to be employed (92.7%), compared with those with same age but who do not use online forums to interact with family and friends (78.9%%).

Respondents who have no income and who use the internet to search for jobs (64%) are most likely to be unemployed, compared with those do not use the internet to search for jobs (35%). Respondents who do not use the internet to search for jobs but who use it to search for information (66.4%) are most likely to fall in the other category (retired; self-employed), compared with those who do not use the internet to search for information (52.7%). Respondents who use the internet to search for information and who are older than 27 years of age (82.1%) are most likely to be unemployed, compared with those who are younger than 27 years of age (54.9%).

Respondents who earn [R0–R5000] and who use the internet to search for jobs (66.1%) are most likely to be unemployed, compared with those who do not use the internet to search for jobs (37.7%)

In conclusion, most respondents in urban areas are employed. Five factors were found to predict their employment status, namely: income (1), using the internet to search for jobs (2), age (3), using online forms to interact with family/friends (4) and using the internet to search for information (5).

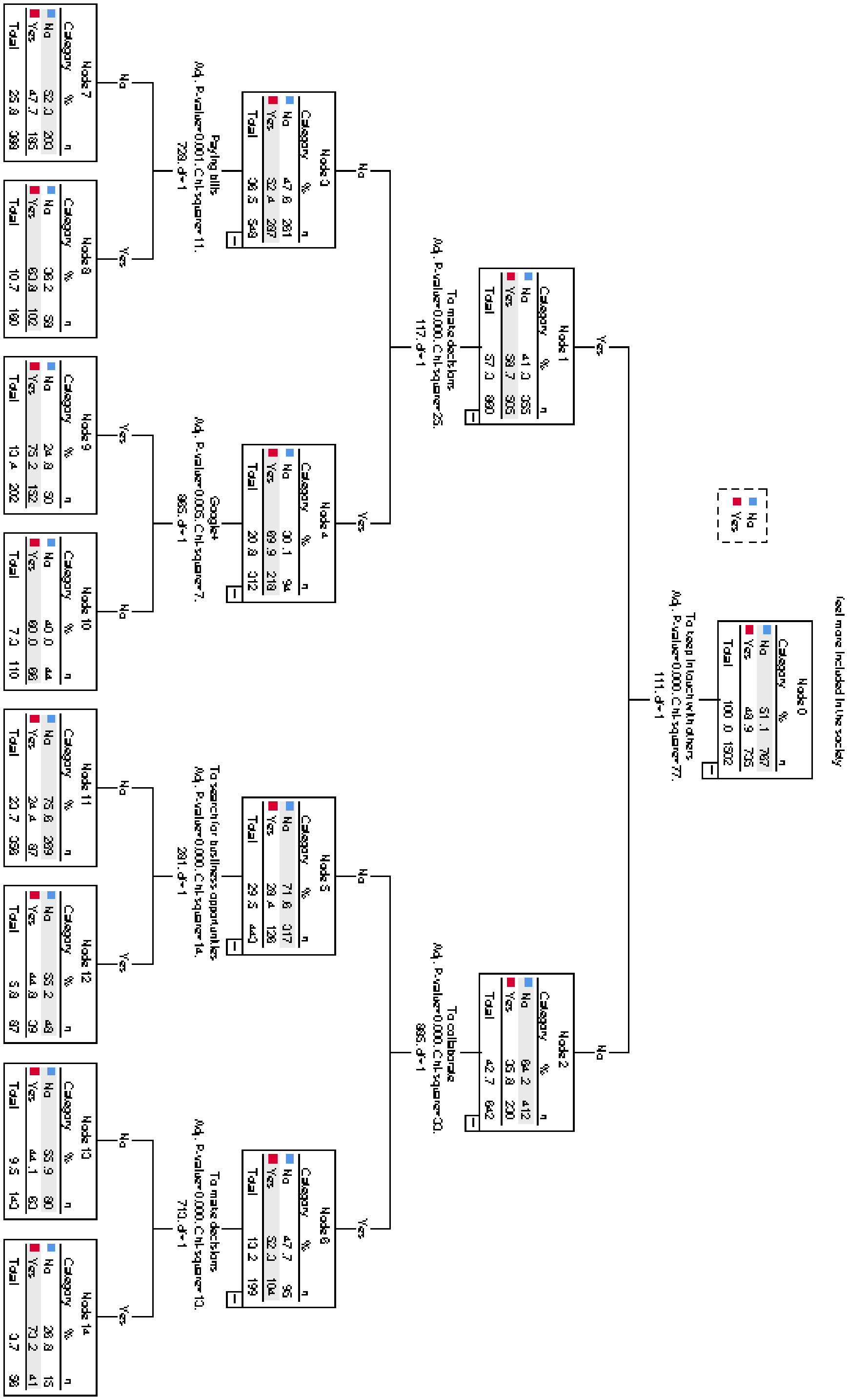

Figure 15: Decision tree of social inclusion

The decision tree of social inclusion (Figure 15) indicates that 51.1% of the respondents in urban areas feel socially excluded and 48.9% feel socially included. According to the tree, the strongest predictor of social inclusion in urban areas is internet usage to keep in touch with others because it has the highest Chi-square (77.111) and the lowest p-value (.000). The results indicate that respondents who do not use the internet to keep in touch with others (64.2%) are most likely to feel socially excluded, compared with those who do use the internet to keep in touch with other (41.3%).

Respondents who use the internet to keep in touch with others and to make decisions (69.9%) are most likely to feel more socially included, compared with those who also use the internet to keep in touch with others but who do not use the internet to make decisions (52.4%). Respondents who do not use the internet to make decisions but who use the internet to pay bills (63.8%) are most likely to feel socially included, compared with those who do not use the internet to pay bills (47.7%). Respondents who use the internet to make decisions and who use Google (75.2%) are most likely to feel more socially included, compared with those who also use the internet to make decisions but who do not use Google (60%).

Respondents who do not use the internet to keep in touch with others and online forums to collaborate with others (71.6%) are most likely to feel socially excluded, compared with those who also do not use the internet to keep in touch with others but who use online forums to collaborate with others (47.7%). Respondents who do not use online forums to collaborate with others and internet to search for business opportunities (75.6%) are most likely feel more socially excluded, compared with those who use the internet to search for business opportunities (55.2%). Respondents who use online forums to collaborate with others and who use the internet to make decisions (73.2%) are most likely to feel socially included, compared with those who do not use the internet to make decisions (55.9%) who are likely to feel socially excluded.

In conclusion, most respondents in urban areas report feeling excluded from the society. Six factors were found to predict their feeling of social inclusion, namely: using the internet to keep in touch with others (1), participation in online forums to collaborate (2), using the internet to make decisions (3), pay bills (4), Google usage (5) and using the internet to search for business opportunities (6).

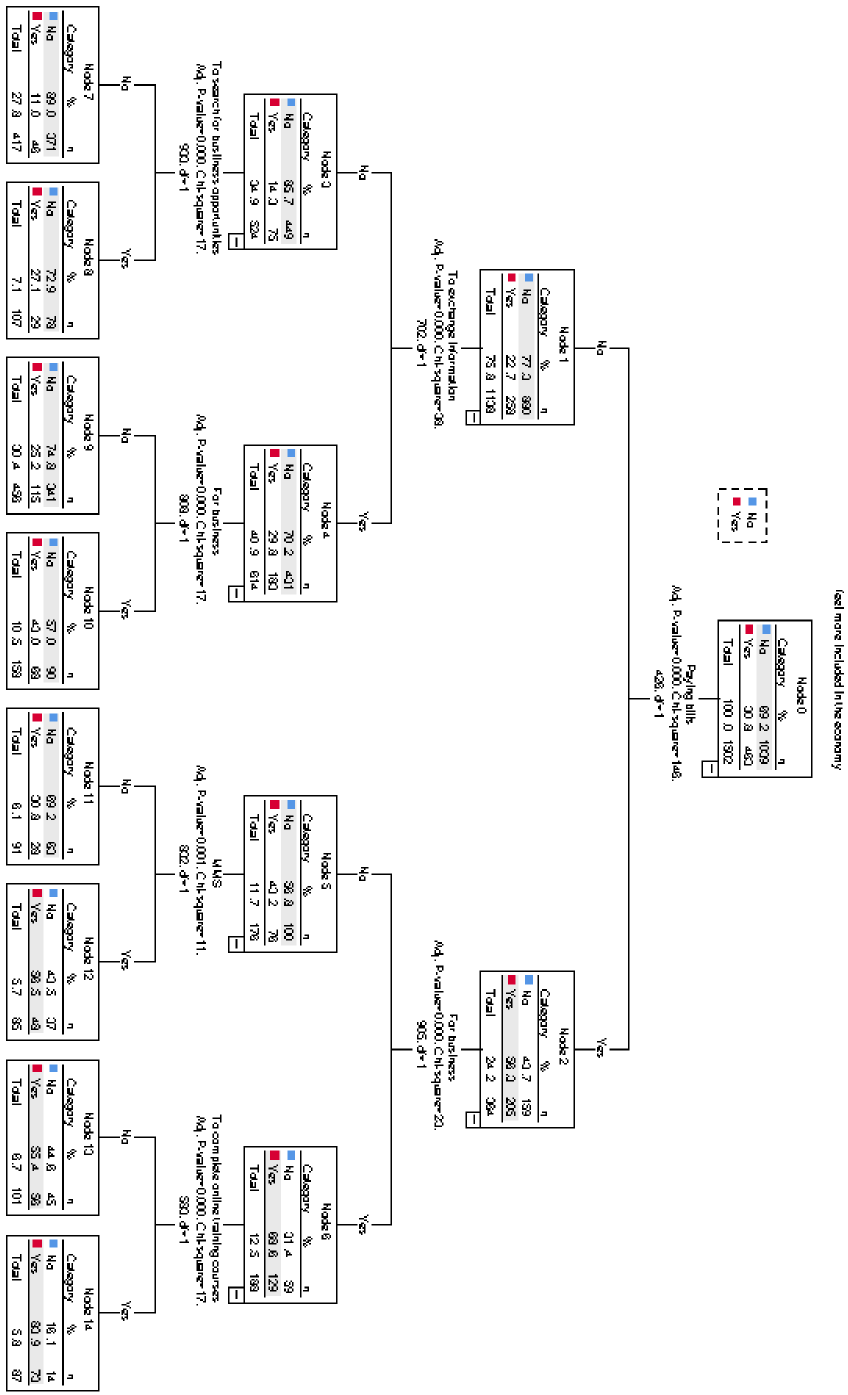

Figure 16: Decision tree of economic inclusion

The decision tree of economic inclusion (Figure 16) indicates that 69.2% of the respondents in urban areas do not feel included in the economy while 30.8% feel economically included. According to the tree, the strongest predictor of economic inclusion in urban areas is internet usage to pay bills because it has the highest Chi-square (146.426) and the lowest p-value (.000). The results indicate that respondents who do not use the internet to pay their bills (77.3%) are most likely to feel excluded from the economy compared with those who use the internet to pay their bills (43.7%). Respondents who do not use the internet to pay their bills and to exchange information (85.7%) are most likely to feel economically excluded, compared with those who use the internet to exchange information (70.2%).

Respondents who do not use the internet to exchange information and to search for business opportunities (89%) are most likely to feel economically excluded, compared with those who also do not use the internet to exchange information but who use it to search for business opportunities (72.9%). Respondents who use the internet to exchange information and who do not use it for business are most likely to feel economically excluded, compared with those who use the internet for business (57%).

Respondents who use the internet to pay bills and for businesses (68.6%) are most likely to feel economically included, compared with those who also use the internet to pay bills but who do not use it for business (43.2%). Respondents who do not use the internet for business and who do not have MMS on their devices (69.2%) are most likely to feel socially excluded, compared with those who have MMS on their devices (43.5%). Respondents who use the internet for business and to complete online training courses (83.9%) are most likely to feel more economically included, compared with those who do not use the internet to complete online training courses.

In conclusion, most respondents in urban areas do not feeling included in the economy. Six factors were found to predict the feeling of economic inclusion in urban areas, namely: using the internet to pay bills (1), using the internet to search for business opportunities (2), level of online safety (2), using the internet to exchange information (3), using the internet to complete online training courses (4), using the internet for business (5) and using MMS on device (6).

Appendix C: Inferential Analyses

Statistically Significant Correlations and Relationships

The following set of relationships is not conclusive – much more can be done. What is offered here is a sample of the significant relationships (p=0.05) that were found (Appendix B). As noted in the Executive Summary, the full set of data will be made available on the www.k4i.co.za website in order to allow for more interactive data analyses.

Household Income

Household Income and Digital Ownership

- The household's income increases with the monthly expenditure on mobile data.
- Owning a feature phone is related to having a lower income.
- Smartphone ownership is evenly spread out across all income groups.
- Owning a laptop or television is related to having a higher income.

Household Income and Digital Access

- Respondents with access to the internet at home have a higher income level.
- Those with free access to the internet have a higher income level.

Therefore, a higher income appears to be associated with greater digital ownership and increased digital access.

Household Income and Digital Awareness and Usage

- The methods applied to learn to use digital technologies do not increase the income. This means that all income groups are much the same when it comes to learning to use digital technologies.
- Respondents who use the internet for entertainment have a lower income.
- Those who search for jobs and business opportunities on the internet have a higher income.
- Those who complete online training courses have a higher income.
- Those who keep in touch with others have a higher income.

- Those who bank and shop online have a higher income.
- Those who move/transfer money through Shoprite/Checkers have a lower income.
- Those who move/transfer money with online banking have a higher income.
- Those who move/transfer money through E-wallet/Mobile banking have a higher income.
- Those who use the internet to market goods have a higher income.

A higher income is associated with searching for jobs on the internet, completing online training courses, banking online, shopping online, paying bills online, and using the internet to market goods, identify the use of digital technologies, and feel more included in society as a result of using digital technologies.

A lower income is associated with moving money using large retails stores such as Shoprite/Checkers, and using the internet for entertainment.

Household Expenditure

Household Expenditure and Digital Ownership

- Household expenditure on food increases with the monthly expenditure on mobile data.
- Respondents who own a feature phone are more likely to have less household expenditure on food.
- Those who own a laptop are more likely to have a higher household expenditure on food.
- Those who own a personal computer are more likely to have a higher household expenditure on food.
- Those who own a television are more likely to have a higher household expenditure on food.
-

Household Expenditure and Digital Access

- Respondents who have access to the internet at home have a higher level of household expenditure on food.
- Those who can use a computer/laptop are more likely to have a higher household expenditure on food than those who cannot use a computer/laptop.

- Those who use the internet to complete online courses have a higher level of household expenditure on food.
- Those who are aware of online banking have a higher household expenditure on food.
- Those who use online banking are more likely to have a higher household expenditure on food.

Household Expenditure and Digital Awareness/Usage

- The methods applied to learn have no effect on the household's income level.
- Respondents who use the internet for entertainment have a lower level of expenditure on food.
- Those who search for jobs on the internet spend are more likely to have a higher household expenditure on food.
- Those who search for information on the internet have a higher-level of household expenditure on food.
- Those who use online banking have a higher-level of household expenditure on food.
- Those who pay bills on the Internet have a lower level of household expenditure on food.
- Those who move/transfer money via Shoprite/Checkers have a lower household expenditure on food.
- Those who move/transfer money via online banking have a higher household expenditure on food.
- Those who use e-wallet/mobile money to move/transfer money have a higher household expenditure on food.
- Those who use the internet to sell goods/services have a higher household expenditure on food.

Household Expenditure and Digital Benefits

- Respondents who feel more included in the economy are more likely to have a higher household expenditure on food.

Household expenditure and 21st Century Skills

- Respondents with high information data literacy also report high household expenditure on food.

Household Expenditure and Self-efficacy

- Respondents who have a high self-efficacy are more likely to have a higher household expenditure on food.
- Those who have a high ICT self-efficacy are more likely to have a higher household expenditure on food.

Household Expenditure and Digital Government|

- Respondents who have visited any government website are more likely to have a higher household expenditure on food.
- Those who do not believe government websites/apps should be available in their home language (official languages of South Africa) are more likely to have a higher household expenditure on food.
- Those who log a query regarding government services are more likely to have a higher household expenditure on food.
- Those who pay online for a service (e.g. municipal bills) are more likely to have a higher household expenditure on food.
- Those who often interact with government officials/departments on social networking sites and do not receive a communication have higher household expenditure on food.

Employment Status

Employment Status Significant Results

- Respondents who monthly spend more on mobile data are most likely to be those who are employed.
- Those who own a laptop are 1.31 times (1/.761) more likely to be those who are unemployed.
- Those who own a personal computer are 1.56 times (1/.640) more likely to be those who are unemployed.
- Those who own a TV are 1.79 times (1/.557) more likely to be those who are unemployed.
- Those who have access to free internet are 1.23 times (1/.808) more likely to be those who are unemployed.
- Those who use the internet to search for jobs are 1.474 times more likely to be those who are employed.
- Those who use the internet to complete online training courses are 1.54 times (1/0,649) more likely to be those who are unemployed.

- Those who use the internet to keep in touch with others are 1.3 times more likely to be those who are employed.

Employment Status and 21st Century Skills

- Respondents with high data literacy are also most likely to be those employed.
- Those who are safer on online are most likely to be those employed.

Social Inclusion

Social Inclusion

- Respondents who own a feature phone are 1.48 times (1/0,672) more likely to be those who do not feel more included in the society.
- Those who use the Internet for entertainment are 1.21 times (1/0,820) more likely to be those who do not feel more included in the society.
- Those who use the internet to search for jobs are 1.335 times more likely to be those who feel more included in the society.
- Those who use the internet to search for business opportunities are 1.28 times (1/0,778) more likely to be those who do not feel more included in the society.
- Those who use the internet to complete online training courses are 1.57 times (1/0,633) more likely to be those who do not feel more included in the society.

Household's Total Income as the Dependent Variable

The variable household's total income (INCOME) was measured as an interval variable. Thus, in investigating the effect of the independent variables on income, various types of statistical data analysis techniques were used. These include linear regression and ANOVA.

Demographic Variable (Estimate How Much You Spend on Mobile Data Per Month)

A regression analysis was conducted to evaluate the relationship between monthly expenditure and mobile data on the household's total income.

Table 1: Linkage between income and monthly expenditure on mobile data

	Beta	t-value	p-value	Conclusion

Estimate how much you spend on mobile data per month	**0,273**	**15,512**	**0,000**	**The household's income increases with the monthly expenditure on mobile data affects**

Notes:

1. Beta represents the strength of the effect of the independent variable on the dependent variable (INCOME).

2. p-value (and t-value) refers to the significance of the statistical test. When the p-value is below 0.05 it means that the effect is statistically significant.

3. The row/s in bold represent/s the significant relationship/s.

Ownership (Do You Own Any of the Following?)

Given that the options of this question were all dichotomous (Yes=1 and No=0), a linear regression was conducted to evaluate the linkage with each ownership devices.

Table 2: Linkage between income and ownership

	Beta	**t-value**	**p-value**	**Conclusion**
Feature phone	**–0,062**	**–2,916**	**0,004**	**Respondents who own a feature phone have a lower income**
Smart phone	0,031	1,430	0,153	
Tablet	0,036	1,795	0,073	
Laptop	**0,091**	**4,582**	**0,000**	**Respondents who own a laptop are more likely to have a higher income**
Personal computer	0,026	1,336	0,182	
Television	**0,058**	**3,029**	**0,002**	**Respondents who own a television are have a higher income**

Note: The rows in bold represent the significant relationships.

Access (Multiple Questions)

The evaluation of the effect of access on income was made through multiple questions. The following tables show the results of the regression analysis.

Table 3: Linkage between income and access

	Beta	**t-value**	**p-**	**Interpretation**

			value	
Do you know what the internet is?	0,012	0,557	0,577	
Do you have access to the internet at home?	**0,132**	**6,644**	**0,000**	**Individuals who have access to the internet have a higher income level**
Do you have access to free internet?	0,033	1,718	0,086	
Do you know what WIFI is?	0,028	1,297	0,195	

Note: The row in bold represents the significant relationship.

Awareness (Multiple Questions)

Table 3 indicates that income is influenced by the knowledge of internet, the access to internet at home and the awareness of online banking. The other variables have no effects on INCOME.

A one-way ANOVA was conducted to examine the relationship between income and methods applied to learn to use computer/laptop.

Table 4: Linkage between income and methods applied to learn to use computer/laptop

	Mean	Std. Deviation	F-value	p-value	Interpretation
Self-taught	3,17	2,069	2,476	0,060	The methods applied to learn to use the computer do not increase the income
Attended a course	3,37	1,884			
Informal learning	3,24	2,078			
Other	3,90	2,469			

The linkage between income and the other variables related to awareness and usage was also investigated and is presented in Table 5.

Table 5: Linkage between income and other variables related to awareness and usage

What do you use the internet for?	Beta	t-value	p-value	Interpretation
Entertainment	**.036**	**1.837**	**.066**	**Respondents who use the internet for entertainment have a lower income (90% interval)**

Search for jobs	**–.073**	**–3.897**	**.000**	**Respondents who search for jobs on the internet have a higher income**
Search for information	.014	.732	.464	
Search for business opportunities	.020	1.046	.296	
Complete online training courses	**.051**	**2.686**	**.007**	**Respondents who complete online training courses have a higher income**
Keep in touch with others	**.048**	**2.446**	**.015**	**Respondents who keep in touch with others have a higher income**
Online banking	**.053**	**2.357**	**.019**	**Respondents who bank online have a higher income**
Online shopping	**.069**	**3.310**	**.001**	**The respondents who shop online have a higher income**
Paying bills	**.108**	**4.886**	**.000**	**People who pay their bills online tend to have a higher income**
Other	–0,024	–0,779	0,436	
How do you move money/transfer money?				
Shoprite/Checkers	**–.069**	**–3.689**	**.000**	**Respondents who move/transfer money through Shoprite/Checkers have a lower income**
Online banking	**.058**	**2.974**	**.003**	**Respondents who move/transfer money with online banking have a higher income**
E-wallet/Mobile money	**.092**	**4.833**	**.000**	**Respondents who move/transfer money through E-wallet/Mobile banking have a higher income**
Others	–.010	.521	.602	
Do you use the internet for any of the following activities?				
Marketing goods	**0,081**	**4,163**	**0,000**	**Respondents who use the Internet to market goods have a higher income**
Selling goods/services	0,032	1,621	0,105	
Information about growing food	0,000	–0,019	0,985	

Note: The rows in bold represent the significant relationships.

No significant effect was found for the questions: "How do you move money/transfer money?" and "Do you use money for any of the following activities?"

Benefits (What benefits do you derive from using computers/mobile phones?)

The linkage between the perceived inclusion in the society and economy and Income level was tested through a regression analysis. Table 6 presents the results.

Table 6: Linkage between income and perceived inclusion in the economy and society

What benefits do you derive from using computers/mobile phones?	Beta	t-value	p-value	Conclusion
Feel more included in the society	0.022	1.107	0.268	
Feel more included in the economy	**0,141**	**7.065**	**0,000**	**Individuals who feel more included in the economy have a higher income**

Note: The row in bold represents the significant relationship.

Table 6 shows that only the perceived inclusion in the economy has an effect on income.

E-Skills (Multiple Variables)

The association between e-skills and income was assessed through a regression analysis as summarised in Table 7.

Table 7: Nexus between e-skills and income

E-skills	Beta	t-value	p-value	Conclusion
Information data literacy	0,011	0,317	0,752	
Communication collaboration	**–0,061**	**–2,140**	**0,032**	**The e-skills related to communication and collaboration are more likely to be developed by respondents of a lower-income level**
Safety	**–0,085**	**–2,508**	**0,012**	**The e-skills related to safety are more likely to be developed by respondents**

				of a lower-income level
Problem solving	0,035	1,208	0,227	
I am aware of the legal implications of using the internet.	−0,031	−1,154	0,248	
Have you ever been a victim of cybercrime or fraud (e.g. identity theft, credit card fraud)?	**0,045**	**2,441**	**0,015**	**Individuals who have been a victim of cybercrime or fraud tend to have a higher income**

Note: The rows in bold represent the significant relationships.

Surprisingly, Table 7 shows that only problem solving has no effect on income level (p-value > 0.05).

Self-Efficacy (ICT and General)

The joint influence of ICT self-efficacy and general self-efficacy was investigated through a linear regression.

Prior to testing the effects of self-efficacy variables, a Confirmatory Factor Analysis (CFA) was conducted to evaluate whether these constructs are valid and reliable.

Confirmatory Factor Analysis: Self-Efficacy

The CFA was conducted to test the validity and reliability of the constructs ICT self-efficacy and general self-efficacy. The items ICT2 and GEN2 were dropped because they were affecting the internal consistency and validity of the scale. Table 8 presents the results of the CFA.

Table 8: CFA – Self-efficacy

Construct	**Items**	**Factor loading**	**CR**	**AVE**
ICT self-efficacy	ICT1	0,854	0,933	0,610
	ICT3	0,875		
	ICT4	0,88		
	ICT5	0,875		
	ICT6	0,871		
	ICT7	0,876		
	ICT8	0,889		
	ICT9	0,884		
	ICT10	0,863		
General self-efficacy	GEN1	0,701	0,967	0,765

	GEN3	0,784		
	GEN4	0,819		
	GEN5	0,814		
	GEN6	0,784		
	GEN7	0,793		
	GEN8	0,828		
	GEN9	0,827		

According to Table 8, the constructs general self-efficacy and ICT self-efficacy are reliable (all CR above 0.7) and valid because the factor loadings and AVEs are above 0.5.

Given that the constructs ICT and General self-efficacy are valid and reliable, the regression test was conducted and summarised in Table 9.

Table 9: Linkage between income and self-efficacy

Self-efficacy	Beta	t-value	p-value	Interpretation
General self-efficacy	–.016	–.844	.398	
ICT self-efficacy	**–.112**	**–5.891**	**.000**	**Individuals who have a high ICT self-efficacy are mostly of higher income groups**

Note: The row in bold represents the significant relationship.

Government to Citizen (Multiple Questions)

The nexus between the G2C and income was evaluated through a series of regression analyses as summarised in Table 10.

Table 10: Nexus between the G2C and income

	Beta	t-value	p-value	Conclusion
Have you visited any government website before?	**0,065**	**3.258**	**0,001**	**People who have visited any government website have a higher income level**
Do you trust government websites or apps?	0,009	0.428	0,669	
Do you believe government websites/apps should be	**–0,065**	**–3.217**	**0,001**	**Respondents who believe government websites should be**

available in your home language (official languages of South Africa)?				**available in their home language tend to have a lower income**
Applied for a government service	0,000	–0,018	0,986	
Log a query regarding government service	0,022	1,203	0,229	
Pay for a service e.g., Municipal bills	**0,050**	**2,670**	**0,008**	**Respondents who pay for services (e.g. municipality bills) tend to have a higher income level than those who do not pay for services**
Do you have an account on any of the following social networking sites?				
Twitter	.019	.890	.374	
Facebook	.019	.960	.337	
Instagram	**.093**	**4.215**	**.000**	**Respondents who have an Instagram account have a higher income level than those who do not have an Instagram account**
How often do you use the government page/account on social networking sites?	–.027	–1.233	.218	
How often do government officials / departments that you interact with on social networking sites respond to your communication?	**–.076**	**–3.447**	**.001**	**Respondents who often interact with government officials / departments on social networking sites and do not receive a communication have lower income**

Note: The rows in bold represent the significant relationships.

Household Expenditure as the Dependent Variable

The variable household expenditure (How much do you spend on food only per month for your household?) was measured as an interval variable. Similar to the variable income above, investigating the effect of the independent variables on expenditure, various types of statistical data analysis techniques were used. These include linear regression and ANOVA.

Demographic Variable (Estimate How Much You Spend on Mobile Data per Month)

A regression analysis was conducted to evaluate the relationship between monthly expenditure and mobile data on the total household expenditure on food.

Table 11: Linkage between household expenditure and monthly expenditure on mobile data

	Beta	t-value	p-value	Conclusion
Estimate how much do you spend on mobile data per month	**0,163**	**8,792**	**0,000**	**The household's expenditure increases with the monthly expenditure on mobile data affects**

Note: The rows in bold represent the significant relationships.

Ownership (Do You Own Any of the Following?)

Given that the options of this question were all dichotomous (Yes=1 and No=0), a linear regression was conducted to evaluate the linkage with each ownership devices.

Table 12: Linkage between household expenditure and ownership

	Beta	t-value	p-value	Conclusion
Feature phone	**–0,046**	**–2,221**	**0,026**	**Respondents who own a feature phone are more likely to have less household expenditure on food**
Smart phone	0,033	1,570	0,117	
Tablet	0,029	1,501	0,134	
Laptop	**0,116**	**6,035**	**0,000**	**Respondents who own a laptop are more likely to have a higher household expenditure on food**
Personal computer	**0,052**	**2,812**	**0,005**	**Respondents who own a personal computer are more likely to have a higher household expenditure on food**
Television	**0,084**	**4,570**	**0,000**	**Respondents who own a television tend to spend more on food than those who do not own a television**

Note: The rows in bold represent the significant relationships.

Access (Multiple Questions)

The evaluation of the effect of access on household's expenditure was made through multiple questions. Table 13 show the results of the regression analysis.

Table 13: Linkage between household expenditure and access

	Beta	t-value	p-value	Interpretation
Do you know what the internet is?	0,019	0,855	0,392	
Do you have access to the internet at home?	**0,101**	**4,929**	**0,000**	**Respondents who have access to the internet at home have a higher level of household expenditure**
Do you have access to free internet?	0,021	1,057	0,291	
Do you know what WIFI is?	0,006	0,285	0,776	
Can you use a computer/laptop?	**0,048**	**2,381**	**0,017**	**Respondents who can use a computer/laptop are more likely to have a higher household expenditure than those who cannot use a computer/laptop**
Do you use the internet to complete online courses?	**0,044**	**2,273**	**0,023**	**Respondents who use the internet to complete online courses have a higher level of household expenditure**
Are you aware of online banking?	**0,077**	**3,674**	**0,000**	**Respondents who are aware of online banking have a higher household expenditure**
Do you use online banking?	**0,036**	**1,729**	**0,084**	**Respondents who use online banking tend to spend more on food**

Note: The rows in bold represent the significant relationships.

Awareness (Multiple Questions)

A one-way ANOVA was conducted to examine the relationship between the household's expenditure and methods applied to learn to use a computer/laptop.

Table 12: Linkage between household expenditure and methods applied to learn to use a computer/laptop

What is your household's total income per month?			F-value	p-value	Interpretation
	Mean	Std. Deviation			
Self-taught	2306,32	1664,604	0,728	0,535	The methods applied to learn have no effect on the household's income level
Attended a course	2365,43	1596,682			
Informal learning	2205,20	1438,052			
Other	2165,79	1231,085			

The linkage between the household's expenditure and other variables related to awareness and usage was also investigated and is presented in Table 13.

Table 13: Linkages between household expenditure and other variables related to awareness and usage

What do you use the internet for?	Beta	t-value	p-value	Interpretation
Entertainment	.032	1.596	.111	
Search for jobs	**–.073**	**–3.698**	**.000**	**Respondents who search for jobs on the internet spend more on food per month**
Search for information	**.057**	**2.744**	**.006**	**Respondents who search for information on the internet have a higher-level of household's expenditure**
Search for business opportunities	**.068**	**3.395**	**.001**	**Respondents who search for business opportunities online tend to spend more on food items**
Complete online training courses	.017	.839	.402	

Keep in touch with others	.028	1.345	.179	
Online banking	.020	.867	.386	
Online Shopping	**.060**	**2.741**	**.006**	**Respondents who use online shopping have a higher level of household expenditure**
Paying bills	.035	1.524	.128	
Other	**–**.039	**–**2.095	.036	
How do you move money/transfer money?				
Shoprite/Checkers	**–.044**	**–2.265**	**.024**	**Respondents who move/transfer money with Shoprite/Checkers have a lower household expenditure on food**
Online banking	**.055**	**2.754**	**.006**	**Respondents who move/transfer money with online banking have a higher household expenditure**
E-wallet/Mobile money	**.055**	**2.809**	**.005**	**Respondents who use E-wallet/Mobile money to move/transfer money have a higher household expenditure**
Other	.014	.736	.462	
Do you use the internet for any of the following activities?				
Marketing goods	0,034	1,717	0,086	
Selling goods/services	**0,055**	**2,764**	**0,006**	**Respondents who use the Internet to sell goods/services have a higher household expenditure**
Information about growing food	**–**0,001	**–**0,057	0,955	

Note: The rows in bold represent the significant relationships.

No significant effect was found for the questions: "How do you move money/transfer money?" and "Do you use money for any of the following activities?"

Benefits (What Benefits Do You Derive from Using Computers/Mobile Phones?)

The linkage between perceived inclusion in the society and economy and household expenditure was tested through a regression analysis. Table 14 presents the results

.**Table 14:** Linkage between household expenditure and perceived inclusion in the economy and society

What benefits do you drive from using computers/mobile phones	**Beta**	**t-value**	**p-value**	**Conclusion**
Feel more included in the society	0,005	0,262	0,793	
Feel more included in the economy	**0,109**	**5,317**	**0,000**	**Respondents who feel more included in the economy spend more than those who do not**

Note: The rows in bold represent the significant relationships.

Table 14 shows that only perceived inclusion in the economy has an effect on household expenditure.

E-Skills (Multiple Variables)

The association between E-skills and the household's expenditure was assessed through a regression analysis summarised in Table 15.

Table 15: Nexus between E-skills and household expenditure

E-skills	Beta	t-value	p-value	Interpretation
Information data literacy	**–0,098**	**–2,810**	**0,005**	**Information data literacy is related to increases with the household expenditure**
Communication collaboration	–0,032	–1,083	0,279	
Safety	–0,006	–0,174	0,862	
Problem solving	0,012	0,400	0,689	
I am aware of the legal implications of using the internet	–0,010	–0,375	0,708	
Have you ever been a victim of cybercrime or fraud (e.g. identity theft, credit card fraud)?	–0,023	–1,233	0,218	

Note: The row in bold represents the significant relationship.

Self-Efficacy (ICT and General)

The joint influence of ICT self-efficacy and general self-efficacy was investigated through a linear regression.

Table 16: Linkage between household expenditure and self-efficacy

Self-efficacy	Beta	t-value	p-value	Interpretation
General self-efficacy	**–0,049**	**–2.503**	**0,012**	**Individuals who have a high self-efficacy tend to have a higher income too**
ICT self-efficacy	**–0.086**	**–4.430**	**0,000**	**Individuals who have a high ICT self-efficacy are mostly of higher income groups**

Note: The rows in bold represent the significant relationships.

Table 16 establishes that general and ICT self-efficacy are influenced by the Income level of respondents.

Government to Citizen (Multiple Questions)

The nexus between the G2C and household expenditure was evaluated through a series of regression analyses as summarised in Table 17.

Table 17: Nexus between the G2C and household expenditure

	Beta	t-value	p-value	Conclusion
Have you visited any government website before?	**0,065**	**3,258**	**0,001**	**Individuals who have visited any government website are more likely to spend more for food items**
Do you trust government websites or apps?	0,009	0,428	0,669	
Do you believe government websites/apps should be available in your home language (official languages of South Africa)?	**–0,065**	**–3,217**	**0,001**	**Respondents who do not believe government websites/apps should be available in their home language (official languages of south Africa) are more likely to spend more for food items**
Apply for a government service	0,001	0,028	0,978	
Log a query regarding government service	**0,060**	**3,185**	**0,001**	**People who log a query regarding government services, spend more on food**
Pay for a service e.g. Municipal bills	**0,075**	**3,900**	**0,000**	**Respondents who pay for a service (e.g. municipal bills) spend more on food than those who do not pay**
Do you have an account on any of the following social networking sites?				
Twitter	**.046**	**2.030**	**.042**	**Households that have a Twitter account spend more on food items**
Facebook	.007	.358	.720	
Instagram	.019	.820	.412	
How often do you use the government page/account on social networking sites?	–.038	–1.680	.093	

How often do government officials / departments that you interact with on social networking sites respond to your communication?	–.068	–3.022	.003	**Individuals who often interact with government officials / departments on social networking sites and do not receive a communication have lower household expenditure**

Note: The rows in bold represent the significant relationships.

Appendix D: Ethical Clearance Certificate

UNISA university of south africa

UNISA COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY'S (CSET) RESEARCH AND ETHICS COMMITTEE

24 January 2018

Ref #: 01/TM/2018/CSET_SOC
Name: Dr Tendani Mawela
Student #: 90290593

RECEIVED
2018 -01- 30
OFFICE OF THE EXECUTIVE DEAN
College of Science, Engineering and Technology

Dear Dr Tendani Mawela

Decision: Ethics Approval for 3 years
(Humans involved)

Researcher: Dr Tendani Mawela
School of Computing, Florida Campus, ICT4D Flagship
mawelt@unisa.ac.za, +27 11 670 9085; +27 83 679 9808

Project Leader(s): Prof H Twinomurinzi, twinoh@unisa.ac.za, +27 11 670 9361

Proposal: NEMISA-Knowledge for Innovation (Environmental Scans – Phase 1)

Qualification: Research

Thank you for the application for research ethics clearance by the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee for the above mentioned research. Ethics approval is granted for a period of three years, from 24 January 2018 to 24 January 2021.

1. The researcher will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Unisa College of Science, Engineering and

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
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Technology's (CSET) Research and Ethics Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.

3. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.
4. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.

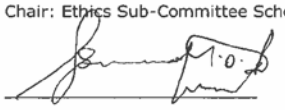
Note:

The reference number 01/TM/2018/CSET_SOC *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee.*

Yours sincerely

Dr. B Chimbo

Chair: Ethics Sub-Committee School of Computing, CSET



Prof I. Osunmakinde

Director: School of Computing, CSET

Prof B. Mamba

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Appendix E: Existing Initiatives and Research

Introduction and Background

This document outlines *existing entities which conduct surveys* that either wholly or partially review e-skills and other related sub-topics with the aim of contextualising the NEMISA environmental scans.

Current Landscape – Existing Initiatives

This section reviews various initiatives and surveys. It will be updated on an ongoing basis to reflect related surveys that other organisations have implemented.

Title	Organisa-Tion	Purpose	Population / Scope	Frequency
MICT SETA Sector Skills Plan 2018–2023 (SSP)		• The SSP maps out and plans for the occupational skills needs in advertising, film and electronic media, electronics, information technology and telecommunications. • It is updated each year to analyse the changes in the sector's labour market. • It reviews the gap between the demand and supply for skills. • It outlines strategies for dealing with the identified challenges. • It publishes top 10 occupations with hard to fill vacancies in the MICT sector.	Information and Communication Technology (ICT) sector	
Population Census	Statistics South Africa (Stats SA)	• The main focus of the census is to take stock and produce a total count of the population without omission or duplication. • Another major focus is to be able provide accurate demographic and socio-economic characteristics pertaining to each individual enumerated. Apart from individuals, the focus is on collecting accurate data on housing characteristics and services.	National	Typically every 5 years (may be increased)

General Household Survey (GHS)	Statistics South Africa (Stats SA)	• The GHS is an omnibus household-based instrument aimed at determining the progress of development in the country. It measures, on a regular basis, the performance of programmes as well as the quality of service delivery in a number of key service sectors in the country. • It covers six broad areas: education, health and social development, housing, household access to services and facilities, food security, and agriculture.	National – All private households in 9 provinces	Annual
JCSE ICT Skills Survey	Joburg Centre for Software Engineering ; MICT; SETA; IT WEB	• The survey is a survey of skills trends in the South African ICT sector. • The objective is to identify the most pressing skills needs from the corporate perspective, balanced with the view of current skills capacity of the practitioners and their intentions for future skills development. • The questionnaire, devised by the JCSE, is in a consistent format to track trends and is published as an on-line survey, with additional responses gleaned from telephonic interviews. • It helps to inform the SETA, employers and other interested stakeholders in terms of skills development needs for their Sector Skills Plans.	National	Annual
Digital Readiness Assessment	Western Cape Provincial Government; Broadband Initiative Unit within the Department of Economic Development and Tourism	• The assessment aims to assess the digital readiness of the province. • It is based on indicators from the World Economic Forum- Network Readiness Index. • It drills down further into the access, use and adoption of ICTs. • It surveys households and individuals in the province. • It will become part of a longitudinal analysis of the impact of broadband in the Western Cape over a period of at least 10 years. • Research is conducted by Research ICT Africa in partnership with UCT/UWC.	Provincial	Annual

United Nations e-Government Survey	United Nations Department of Economic and Social Affairs (UNDESA) Division for Public Administration and Development Management	• Since 2001, the survey has been published by UNDESA. • It provides an analysis of progress in using e-government and how it can support the realisation of the internationally agreed development goals and help address emerging public administration issues. • It measures e-government effectiveness in the delivery of basic economic and social services to people in five sectors: education, health, labour and employment, finance, and social welfare. • It identifies patterns in e-government development and performance as well as countries and areas where the potential of ICT and e-government has not yet been fully exploited and where capacity development support might be helpful.	International	Every 2 years
ICT Development Index (IDI)	International Telecommunication Union (ITU)	• The IDI, which has been published annually since 2009, is a composite index that combines 11 indicators into one benchmark measure. It is used to monitor and compare developments in ICT between countries and over time. • The main objectives of the IDI are to measure: • the level and evolution over time of ICT developments within countries and the experience of those countries relative to others; • progress in ICT development in both developed and developing countries; • the digital divide, i.e. differences between countries in terms of their levels of ICT development; • the development potential of ICTs and the extent to which countries can make use of them to enhance growth and development in the context of available capabilities and skills. • It is divided into three sub-indexes and 11 indicators: • Access sub-index; Use sub-index; and Skills sub-index.	International	Annual

Economist Intelligence Unit	Digital Economy Rankings (e-readiness rankings?)	The scoring categories and weights for the rankings include: • Connectivity and technology infrastructure 20% • Business environment 15% • Social and cultural environment 15% • Legal environment 10% • Government policy and vision 15% • Consumer and business adoption 25%	International	Annual (Last completed in 2010)
Networked Readiness Index	World Economic Forum	• The index measures how well an economy is using ICTs to boost competitiveness and well-being. • It gathers data from international agencies, e.g. the International Telecommunication Union, UNESCO, other UN agencies and the World Bank. • Further indicators come from the World Economic Forum's Executive Opinion Survey, which was completed by over 14 000 business executives in more than 140 countries. • The framework incorporates drivers and impacts. • Drivers: • Readiness = Infrastructure, Affordability, Skills • Usage = Individual, Government, Business • Impacts: • Economic • Social • It also considers the environment (regulatory/political).	International	

European e-Competence Framework (e-CF)	European Union (EU)	• The e-CF version 3.0 provides a reference of 40 competences as required and applied at the ICT workplace, using a common language for competences, skills and capability levels that can be understood across Europe. • In 2016, it became a European standard and was published officially as the European Norm EN 16234-1. • As the first sector-specific implementation of the European Qualifications Framework (EQF), the e-CF was created for: application by ICT service, user and supply companies; managers and human resource departments; education institutions and training bodies including higher education; market watchers and policy makers; and other organisations in public and private sectors.	ICT professionals	
Survey of Adult Skills	Organisation for Economic Co-operation and Development (OECD)	• The Programme for the International Assessment of Adult Competencies (PIAAC) developed and conducts the Survey of Adult Skills. The survey measures adults' proficiency in key information-processing skills – literacy, numeracy and problem solving in technology-rich environments – and gathers information and data on how adults use their skills at home, at work and in the wider community. • It is conducted in over 40 countries and measures the key cognitive and workplace skills needed for individuals to participate in society and for economies to prosper.	International	
IMD World Digital Competitiveness Ranking	IMD World Competitiveness Centre	• The ranking measures a country's ability to adopt and explore digital technologies leading to transformation in government practices, business models and society in general. • It has been in place for 29 years. • It highlights Productivity SA as a key partner for information on South Africa. • It looks at three main factors (which have subfactors): 1. Knowledge 2. Technology 3. Future readiness	International	

Digital Economy and Society Index (DESI)	European Commission	• The DESI is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness. • It reports on following six areas: 1. Connectivity 2. Human capital digital skills 3. Use of internet services by citizens 4. Integration of digital services by businesses 5. Digital public services 6. Research and development ICT	Across Europe	
STEP Skills Measurement Progam	World Bank	• The STEP Program is an initiative to measure skills in low- and middle-income countries. It provides policy relevant data to enable a better understanding of skill requirements in the labour market, backward linkages between skills acquisition and educational achievement, personality, and social background, and forward linkages between skills acquisition and living standards, reductions in inequality and poverty, social inclusion, and economic growth. It includes a household-based survey and an employer-based survey. • The household-based survey introduces three unique modules: - Direct assessment of reading proficiency and related competencies scored on the same scale as the PIAAC - Self-reported information on personality, behaviour, and time and risk preferences (e.g. Big Five, Grit, decision-making, and hostile attribution bias) - Job-relevant skills that respondents possess or use in their jobs		

Digital Competence Framework (DIGCOMP)	European Commission	• The DIGCOMP comprises five competence areas and 21 digital competences.
		• It was first published in 2013 and has become a reference for the development and strategic planning of digital competence initiatives both at European and Member State level.
		• The current DigComp 2.0 incorporates the following:
		  - Information and data literacy: To articulate information needs; to locate and retrieve digital data, information and content; to judge the relevance of the source and its content; to store, manage and organise digital data, information and content.
		  - Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity; to participate in society through public and private digital services and participatory citizenship; to manage one's digital identity and reputation.
		  - Digital content creation: To create and edit digital content; to improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied; to know how to give understandable instructions for a computer system.
		  - Safety: To protect devices, content, personal data and privacy in digital environments; to protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion; to be aware of the environmental impact of digital technologies and their use.
		  - Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments; to use digital tools to innovate processes and products; to keep up-to-date with the digital evolution.
			Across Europe	

Lloyds Bank Business and Charity Digital Index	Lloyds Bank and its partner organisations	• The index is a measure of digital capability. • It is based on the UK Basic Digital Skills Framework. • It combines data from the online behaviour of UK Companies and Primary Quantitative Survey with 2000 SMEs and charities. • In order to have full basic digital skills an organisation must be able to undertake at least one task in each of the five categories: 1. Communicating 2. Creating 3. Managing information 4. Problem solving 5. Transacting.	Across the UK – All business sectors (SME); Charity sector	Annual – Benchmarked against the first baseline conducted in 2014

Appendix F: Survey Data

Available on Request (info@nemisa.co.za).

Appendix G: Research Information and Consent Form

E-skills and Digital Literacy in South Africa

Introduction

This form is to obtain consent for your participation in the research project conducted by NEMISA and UNISA ICT4D Flagship.

Purpose of Research

This study is aimed at gathering your views regarding your electronic/digital skills.

Procedure

The entire questionnaire will require approximately 45 minutes of your time.

Confidentiality

The input you provide will be treated confidentially and only be used towards completion of the afore-mentioned research project. All data will be used in summary form without reference to any individual.

Participation

Participation in this study is voluntary, and you have the right, at any time, to withdraw or refuse to participate without any sanctions.

Benefits and Compensation

There are no direct benefits for your participation. All findings will be used for the completion of the academic research project mentioned. No compensation will be provided to anyone participating in this study.

Risks and Discomforts

There are no risks or discomforts associated with your participation. All answers from you and other participants will be analysed collectively. Individual answers will therefore not be linked to any names, positions and companies of participants.

Participant's Consent

I have read and understood all the above. I willingly choose to participate in this study.

Full Names (Optional)

_____

Date:

_____

Signature (Optional):

_____

Contact No:

_____

Section 1: Demographic Information

Demographic Information		
#	**Description**	**Response Items (Codes)**
1	What is your gender?	Male (1) Female (2) Transgender (3) Other, specify (4)
2	In which year were you born?	
3	Population group (choose only one)	Black (1) Coloured (2) Indian or Asian (3) White (4) Other, specify (5):
4	First language (choose only one)	Afrikaans (1) English (2) IsiNdebele (3) IsiXhosa (4) IsiZulu (5) Sepedi (6) Sesotho (7) Setswana (8) Sign Language (9) SiSwati (10) Tshivenda (11) Xitsonga (12) Other, specify (13)
5	Province of residence in South Africa (choose only one)	Eastern Cape (1) Free State (2) Gauteng (3) KwaZulu-Natal (4) Limpopo (5) Mpumalanga (6) North West (7) Northern Cape (8) Western Cape (9)
6	Local Municipality	
7	Which of the following would you consider to be applicable to the area where you live? Choose one option:	Urban Area (1) Peri-Urban Area (2) Rural Area (3)
8	Highest Educational Attainment Mark only one.	Pre-Matric / Pre-Grade 12 / Pre-Standard 10 (1) Matric / Grade 12 / Standard 10 (2) Certificate (3) Diploma (4) Undergraduate / Bachelors /

		BTech Degree (5) Postgraduate Qualification (6) Other, specify (7)
9	If you selected any of the following categories as your highest educational attainment in the previous question: Certificate / Diploma / Undergraduate / Postgraduate / Other Then please answer the following: Is the qualification or field of study related to Information and Communication Technologies (ICT)?	No (0) Yes (1)
10	What is your current employment status? Mark only one oval.	Unable to work (1) Unemployed (2) Employed Full-time – Permanent / Contract / Temp (3) Employed Part-time – Permanent / Contract / Temp (4) Self-employed / Business owner (5) Student / Scholar (6) Retired / Pensioner (7) Other, specify (8)
11	If you selected Unemployed above, for how long have you been unemployed?	Number of months unemployed
12	Marital status	Married (1) Living together like married partners (2) Never married (3) Widower / Widow (4) Separated (5) Divorced (6)
13	Number of dependents	
14	Do you have a personal email account?	No (0) Yes (1)
15	Do you have a bank account?	No (0) Yes (1)
16	What is the source of your personal income?	No income (1) Government / Social grant (2) Salary / Commission (3) Business (4) Other, specify (5)

17	What is your household's total income per month?	No income (1) R0–R5000 (2) R5001–R10 000 (3) R10 001–R20 000 (4) R20 001–R30 000 (5) > R30 000 (6) Decline to answer (7)
18	Which mobile network/s do you use? (Tick all options that apply to you.)	MTN (1) Vodacom (2) Cell C (3) Telkom Mobile (4) Other, specify (5)
19	Estimate how much you spend on mobile data per month.	0 (1) R1–R50 (2) R51–R100 (3) R101– R150 (4) R151–R200 (5) > R200 (6)
20	Are you a member of a stokvel?	No (0) Yes (1)
21	Are you a member of a co-operative? (Note: A co-operative is a business where a group of people get together on a voluntary basis to address a common need or distinct form of enterprise that provides products and services to its members.)	No (0) Yes (1)
22	Do you grow your own food?	No (0) Yes (1)
23	May we contact you again in future e.g. to participate in other research studies?	No (0) Yes (1)
24	If yes, then enter your email address.	

Section 2: Digital Ownership

Digital Ownership		
#	**Description**	**Response Items (Codes)**
1	Ownership – Devices: Do you own any of the following? (Tick all options that apply to you.)	Feature phone (1) Smart phone (2) Tablet (3) Laptop (4) Personal Computer (PC) (5) TV (6)

2	How did you get your phone / tablet / PC?	Not applicable (1) Bought it cash (2) Got it on contract (3) It was a gift (4) Other, specify (5)
3	Ownership – Other: Do you own any of the following? (Tick all options that apply to you.)	Land (1) House (2) Livestock (3)
4	If you own a house what is the type of dwelling?	Informal dwelling (1) RDP house (2) Village house (3) House in town (4)
5	How have you sourced the land / house that you currently live in?	Bought (1) Inherited (2) Rental Lease (3) Right to Occupy (4) Other, specify (5)
6	If you own land, what do you use the land for?	Residential (1) Commercial (2) Agriculture (3) Other, specify (4)

Section 3: Digital Access

Digital Access		
#	**Description**	**Response Items (Codes)**
1	Do you have access to any the following: (Tick all options that apply to you.)	Electricity (1) Local community radio (2) Alternative energy source (e.g. gas, paraffin) (3) Solar (4) Television (5) Computer / Tablet (6) Mobile phone (7)
2	Do you know what the internet is?	No (0) Yes (1)
3	Do you have access to the internet at home?	No (0) Yes (1)
4	Do you have access to free internet?	No (0) Yes (1)

5	If you said yes above, then indicate where you obtain free access. (Tick all options that apply to you.)	School / Campus (1) Work (2) Community centre (3) Library (4) Public spaces e.g. restaurant (5) Other, specify (6) Not applicable (7)
6	Do you know what WIFI is?	No (0) Yes (1)
7	If yes, how often do you use WIFI?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)

Section 4: Digital Awareness and Usage

Digital Awareness and Usage		
#	**Description**	**Response Items (Codes)**
1	What do you use the internet for? (Tick all options that apply to you.)	Entertainment (1) Search for jobs (2) Search for information (3) Search for business opportunities (4) Complete online training / courses (5) Keep in touch with others (6) Online banking (7) Online shopping (8) Pay bills (9) Other, specify (10)
2	Can you use a computer / laptop?	No (0) Yes (1)
3	If yes, how did you learn to use the computer / laptop?	Self-taught (1) Attended a course (2) Informal learning (3) Other, specify (4)

4	What do you use your computer / laptop / mobile device for? (Tick all options that apply to you.)	Make / Receive calls (1) SMS (2) MMS (3) Facebook (4) Skype (5) WhatsApp (6) Email (7) Audio streaming (8) Download podcasts (9) Download / Listen to music (10) Download / Listen videos (11) Take photos (12) Cell phone banking (13) Games (14) Gambling (15) Other, specify (16)
5	How often do you use the following (frequency): Feature phone Smart phone Tablet Laptop Personal Computer (PC) TV (Put a number next to each option.)	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
	Do you use the internet to complete online courses?	No (0) Yes (1)
6	If you use the internet to complete online courses, are the courses accredited?	No (0) Yes (1) I don't know (2)
7	Are you aware of online banking? (Note: Online banking refers to an electronic payment system that enables customers of a bank to conduct financial transaction through the bank's website, e.g. FNB, Absa, etc.)	No (0) Yes (1)
8	Do you use online banking?	No (0) Yes (1)
9	How do you move money / transfer money? (Tick all options that apply to you.)	Shoprite / Checkers or similar option (1) Online banking (2) e-Wallet/Mobile Money (3) Not applicable (4) Other, specify (5)
10	If you are a member of a Stokvel or cooperative, do you use the internet for the activities of the Stokvel / cooperative?	No (0) Yes (1) I don't know (2) Not applicable (3)

11	Do you use the internet for any of the following activities? (Tick all options that apply to you.)	Marketing goods / services (1) Selling goods / services (2) Information about growing food / farming (3)
12	Which do you use more on a daily basis – Mobile phone OR Computer / Laptop? Estimate the % spilt of usage for mobile phone vs computer/laptop. The total must add up to 100%, e.g. Mobile phone 80% Computer 20% OR Mobile phone 100% Computer 0%	Mobile phone xx% Computer / Laptop xx%

Section 5: Digital Benefits

Benefits of ICT / Computers / Mobile Devices		
#	**Description**	**Response Items (Codes)**
1	What benefits do you derive from using computers / mobile phones? (Tick all options that apply to you.)	Improve / Increase your income (1) Feel more included in the society (2) Feel more included in the economy (3) Find employment (4) Prepare for employment (5) Increased confidence (6) Access to information (7) I save money (e.g. transport costs) (8) Other, specify (9)

Section 6: E-Skills or 21st Century Skills

E-Skills or 21st Century Skills		
#	**Description**	**Response Items (Codes)**
	Indicate to what extent you agree with the following statements.	
	Information and Data Literacy	
1	I use the internet to search for information when I want to solve a problem.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

2	I use more than one website when searching for information on the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
3	I use different sources of information when I want to solve a problem.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
4	I verify the information that I have sourced from the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
5	How often do you use the internet to search for information?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
6	I save the information I have gathered / sourced from the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
7	If you chose “Strongly agree” or “Agree” on the previous question, then indicate where / how you save the information. (Tick all options that apply to you.)	Google Drive (1) On my device – computer (2) On my device – mobile phone (3) Drop box (4) i-Cloud (5) Other, specify (6)
8	I know how to back up the information I have sourced from the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
9	I back up my information / documents.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

10	How often do you back up your information / documents?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
11	The information / communication I receive on my device is reliable.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
12	I trust / believe the information that I see on the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
13	I know how to determine / check / verify whether information on the internet is reliable.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
	Communication and Collaboration	
14	The internet enables me to have exchanges of ideas.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
15	I care about how my messages are perceived on the online forums such as WhatsApp and Facebook.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
16	I am aware of the potential impact of what I say on social media.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

17	I participate in the following online forums: (Tick all options that apply to you.)	None (1) WhatsApp (2) Facebook (3) LinkedIn (4) Google+ (5) YouTube (6) Pinterest (7) Instagram (8) SnapChat (9) Viber (10) We-Chat (11) Other, specify (12)
18	If you participate in online forums, then indicate what you use the online forums for. (Tick all options that apply to you.)	To collaborate (1) Social interactions with family / friends (2) For business (3) To exchange information (4) To negotiate (5) To make decisions (6) Other, specify (7)
	Digital Content Creation	
19	I am aware of the legal implications of using the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
	Online Safety	
20	I am aware that what is good / acceptable for me when using the internet may not be good / acceptable for others.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
21	I am offended by messages posted on the online forums such as WhatsApp and Facebook.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
22	I am aware of my digital footprint. (Note: Digital footprint is the information about a particular person that exists on the internet as a result of their online activity / refers to one's unique set of traceable digital activities, actions, contributions and communications that are manifested on the internet or on digital devices.)	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

23	I provide my personal information when interacting on the internet or when requested on the internet.	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
24	I know how to check the safety / authenticity of a website.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
25	I am aware of the financial risks of using the internet, such as: Credit card fraud Banking details exposed Loss of money Identity theft	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly (5)
26	I am aware of tools that will enable me to secure my phone / computer and information when using the internet.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
27	I feel safe using the internet in the following settings: (Tick all options that apply to you.)	At home (1) At work (2) Public spaces (3) Other, specify (4)
28	Browsing the internet opens me up to cybersecurity risks.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
29	Have you ever been a victim of cybercrime or fraud (e.g. identity theft, credit card fraud)?	No (0) Yes (1)
	Problem Solving	
30	How often do you apply what you have learned from the internet?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
31	I easily respond to changes in technology.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

32	I use computers / mobile devices to set goals (e.g. fitness goal to run a marathon).	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
33	To what extent do you use computers / mobile phones to track your daily activities (e.g. reminders, birthdays, number of kilometres completed in preparing for a marathon)?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
34	I use the internet to find courses for my own learning needs.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
35	I find online courses and tutorials useful.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
36	Have you ever completed an online course and received a certificate?	No (0) Yes (1)
37	I use the internet to keep learning and improving myself.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
38	Do you know what an app is?	No (0) Yes (1)
39	Do you use apps?	No (0) Yes (1)
40	Are you aware of free apps / programs?	No (0) Yes (1)
41	If yes above, indicate to which of the following equivalent for free app/programs are you aware of: (Tick all options that apply to you.) The options for each item on the list will be: * Fully Aware/FA * Aware/A * Not Aware/NA	Presentation (1) Publishing (2) Word processor (3) Programming (4) Spreadsheet (5) Project management (6) Mind Maps (7) Email (8) Video (9) Other, specify (10)

42	I use free apps / programs because it is ... (Tick all options that apply to you.)	Easy to use (1) Free/cost effective (2) More efficient / more functionality (3) It's all I know (4) Other, Specify (5)

Section 7: General Self-Efficacy

General Self-Efficacy		
#	**Description**	**Response Items (Codes)**
1	I can always manage to solve difficult problems if I try hard enough.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
2	If someone opposes me, I can find the means and ways to get what I want.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
3	It is easy for me to stick to my aims and accomplish my goals.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
4	I am confident that I could deal efficiently with unexpected events.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
5	Thanks to my resourcefulness, I know how to handle unforeseen situations.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
6	I can solve most problems if I invest the necessary effort.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
7	I can remain calm when facing difficulties because I can rely on my coping abilities.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

8	When I am confronted with a problem, I can usually find several solutions.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
9	If I am in trouble, I can usually think of a solution.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
10	I can usually handle whatever comes my way.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

Section 8: ICT Self-Efficacy

ICT Self-Efficacy (ICT = Information & Communication Technology)		
#	**Description**	**Response Items (Codes)**
1	I can always manage to solve difficult problems using ICT if I try hard enough	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
2	If someone opposes me, using ICT I can find the means and ways to get what I want.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
3	Using ICT, it is easy for me to stick to my aims and accomplish my goals	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
4	I am confident that I could deal efficiently with unexpected events using ICT.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
5	Thanks to my resourcefulness, I know how to handle unforeseen situations using ICT.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

6	I can solve most problems using ICT if I invest the necessary effort.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
7	I can remain calm when facing difficulties because I can rely on using ICT to cope.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
8	When I am confronted with a problem, I can usually find several solutions using ICT.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
9	If I am in trouble, I can usually think of a solution by using ICT.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)
10	Using ICT, I can usually handle whatever comes my way.	Strongly agree (1) Agree (2) Neutral (3) Disagree (4) Strongly disagree (5)

Section 9: Government to Citizen (G2C)

Government to Citizen (G2C)		
#	**Description**	**Response Items (Codes)**
1	Have you visited any government website before?	No (0) Yes (1)
2	Which government department website or app have you looked at? (Tick all options that apply to you.)	Health (1) Education (2) Social Services/Social Development (3) Home Affairs (4) Human Settlements (Housing) (5) Agriculture/Rural Development (6) Co-operative governance and Traditional affairs (7) Economic Development (8) Community Safety (9) Infrastructure Development (10) Roads/Transport (11) Sports/Arts/Culture (12) Treasury (13) Other, specify (14)
3	Which of the following services have you completed online? (Tick all options that apply to you.)	Apply for a government service (1) Log a query regarding a government service (2) Pay for a service (e.g. municipal bills) (3) Other, specify (4)
4	How often do you complete these services online?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
5	Do you have an account on any of the following social networking sites? (Tick all options that apply to you.)	Twitter (1) Facebook (2) Instagram (3) Other, specify (4)
6	How often do you use the government page / account on social networking sites?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)

7	Have you performed any of the following on the government page / account on social networking sites:	Followed or become a fan of a government department or government official? (1) Posted any comments on their page on a social networking site? (2) Read the blog of a government department or official? (3) Posted any comments on their blog? (4)
8	How often do you successfully complete what you have tried to do on a government website (e.g. resolve a query, apply for services)?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
9	How often do government officials / departments that you interact with on social networking sites respond to your communication?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
10	How often have you been satisfied with the responses you received from government officials / departments?	Always (1) Often (2) Half the time (3) Rarely (4) Never (5)
11	Do you trust government websites or apps?	No (0) Yes (1)
12	Do you believe government websites / apps should be available in your home language (official languages of South Africa)?	No (0) Yes (1)

Section 10: Poverty and Social Inclusion

Poverty and Social Inclusion		
#	**Description**	**Response Items (Codes)**
1	How many people live in your household?	
2	About how much do you spend on food **only** per month for your household (in rands/ZAR)?	
3	Has any child under the age of 5 in your household died in the past 12 months?	No (0) Yes (1)
4	Have any members of your household aged 15 or older completed at least 5 years of schooling?	No (0) Yes (1)
5	Is there any school-aged child (aged 7 to 15) in your household that is currently out of school?	No (0) Yes (1)
6	Does your household use paraffin / candles / nothing / other for lighting? Does your household use paraffin / wood / coal /dung / other / none for heating? Does your household use paraffin / wood / coal / dung / other / none for cooking? Does your household have piped water in dwelling or on stand? Does your household have a flush toilet? Is your current dwelling place any of the following: informal dwelling / traditional dwelling /caravan / tent / other? Does your household own one of the following: Radio / television / telephone / refrigerator? Does your household own a car? (Tick each type of fuel.)	Responses for each question: No (0) Yes (1)
7	Are all adults (aged 15 to 64) in the household unemployed?	Responses for each question: No (0) Yes (1)