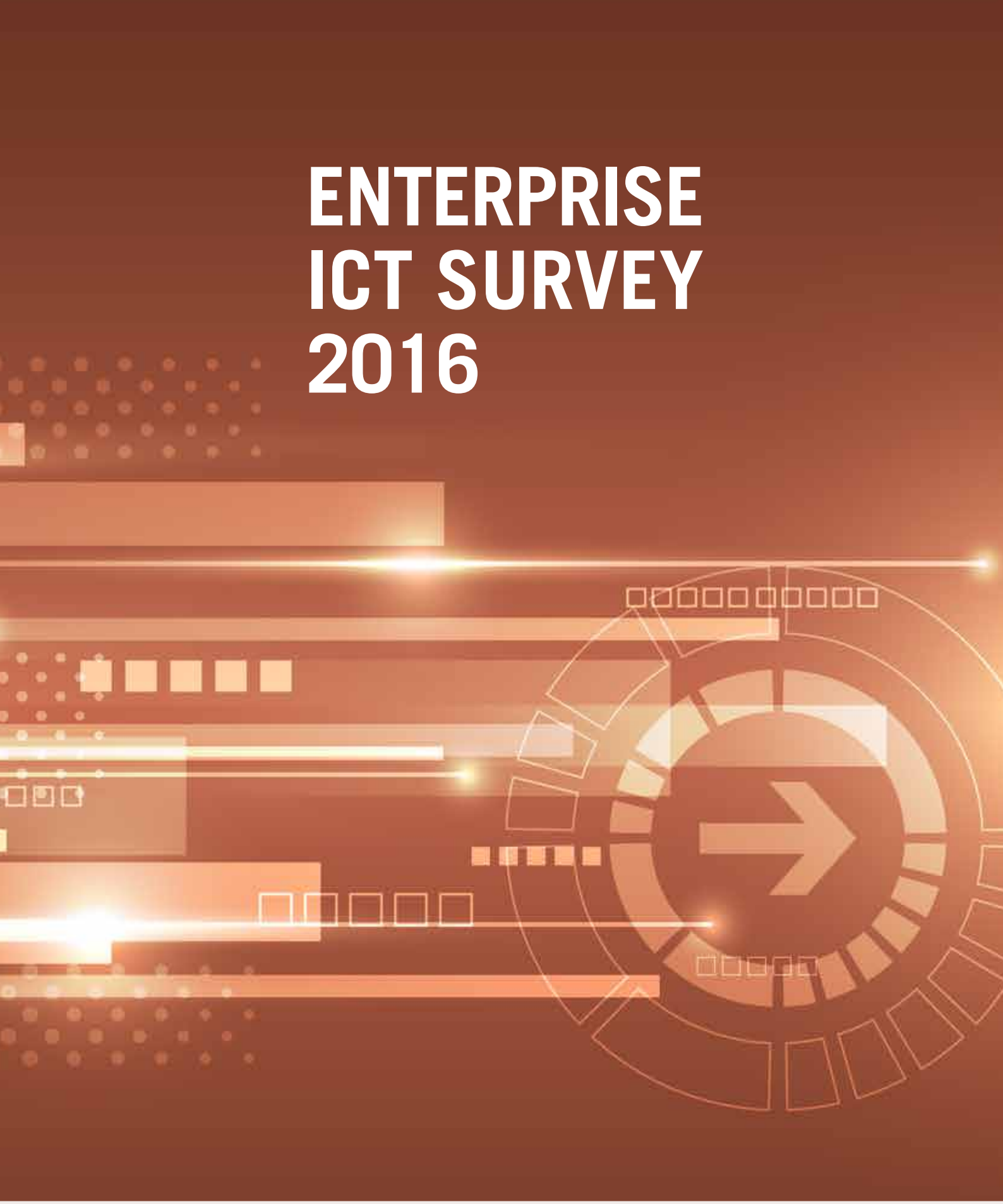
ENTERPRISE ICT SURVEY 2016



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ENTERPRISE ICT SURVEY 2016

Foreword

This report is the outcome of an extensive process that spanned several months and benefited from inputs of stakeholders, experts and users. It is the first dedicated Information and Communication Technology (ICT) survey for the enterprises in Kenya covering over 3,500 enterprises and provides information for a wide range of indicators. Kenya National Bureau of Statistics (KNBS) and Communications Authority of Kenya (CA) jointly carried out the Enterprise ICT Survey 2016 to provide current and comprehensive information on access to and use of ICT.

The Vision 2030 identified ICTs as a key enabler to the attainment of its goals and aspirations. In the vision, the ICT sector is envisaged to transform Kenya into knowledge and information based economy by enabling access to quality, affordable and reliable ICT services which plays an important catalytic role in the economic and social development of the country.

This report highlights the findings from the Enterprise ICT Survey 2016 whose main objective was to measure access to and use of ICT by the enterprises in Kenya. The results of the survey will be useful in informing policy makers, investors, academicians and business leaders on the current uptake of Information and Communication Technologies (ICTs) in the country.

The Enterprise ICT Survey 2016 provides the baseline indicators on availability of ICT, use of ICT infrastructure and applications; penetration of e-commerce; and existence of internal ICT policies in enterprises. We are confident that this report will become a key reference document for those involved directly or indirectly in making policy and business decisions in ICT.

Mr. Zachary Mwangi
Director General
Kenya National Bureau of Statistics

Mr. Francis W. Wangusi, MBS
Director General
Communications Authority of Kenya

Acknowledgement

The Enterprise ICT Survey 2016 was conducted under the overall guidance of Mr. Zachary Mwangi, Director General, KNBS, and Mr. Francis Wangusi, MBS, Director General, CA. The technical working group that was responsible for the implementation of the survey including data collection, analysis and report writing included; Mr. Matano Ndaro, Mr. Collins Omondi, Ms. Susan Mochache (Currently Principal Secretary, State Department of Social Protection), Mr. Paul Kiage, Mr. Bernard Nderitu, Ms. Carolyne Kakemu, Ms. Banchale Gufu, Ms. Maureen Chepng'etich, Mr. Benjamin Muchiri, Mr. Benjamin Avusevwa, Mr. William Etwasi, Ms. Rosemary Chepkoech, Mr. Hiram Mbatia, Mr. Johnstone Poipoi, Mr. Paul Waweru, Mr. James Ng'ang'a, Ms. Tabitha Wambui and Ms. Linah Waitherero.

Various stakeholders were consulted during the survey implementation especially the validation of the questionnaire used in the data collection. The United Nations Conference on Trade and Development (UNCTAD) provided technical assistance in the initial stages of the survey implementation. In particular, Mr. Bouchkkar Bouazza provided technical expertise in the development of the survey instruments, training of survey personnel and editing of this report.

We also wish to acknowledge the 3,530 enterprises that participated in the survey and contributed to its success by diligently completing the questionnaires that provided information in this report.

Acronyms

CA	Communications Authority of Kenya
CIP	Census of Industrial Production
DSL	Digital Subscriber Line
EDI	Electronic Data Interchange
ICT	Information and Communication Technology
ICTs	Information and Communication Technologies
ISIC	International Standard Industrial Classification
KE-CIRT/CC	Kenya National Computer Incident Response Team/Coordination Centre
KNBS	Kenya National Bureau of Statistics
LAN	Local Area Network
NBS	National Broadband Strategy
NOFBI	National Optical Fiber Backbone Infrastructure
OECD	Organization for Economic Co-operation and Development
PSTN	Public Switched Telephone Networks
SEO	Search Engine Optimization
UNCTAD	United Nations Conference on Trade and Development

Executive Summary

Information Communication Technology (ICT) plays an important role in facilitating business operations. This report is based on the findings of the Enterprise ICT Survey 2016 that was conducted between March and May 2016. To ensure international comparability, the survey adopted internationally agreed standards and methodology for compilation of the demand side indicators for the businesses sector. This report provides a reference for baseline indicators on access to and use of ICTs in enterprises.

The use of computers is high across all enterprise sizes with total use at 92.1 per cent. Similarly, use of Internet and its connection in the enterprise premises is high at 90.2 per cent and 84.2 per cent, respectively. The most common type of Internet connectivity is fixed broadband that was used by 81.3 per cent of the enterprises. On the other hand, 40.5 per cent of the enterprises used mobile broadband. Internet provides a communication channel for 88.7 per cent of enterprises who use it for sending and receiving email. Use of Internet for making purchases/orders and for banking was reported by 57.1 per cent and 35.4 per cent of enterprises. Enterprises with a website often have an advantage of reaching current and potential clients. Although a total 50.3 per cent of enterprises reported having a website, it was largely reported by medium and large enterprises. In 2015, 60.4 per cent of the enterprises had Local Area Network (LAN). About 4 in 10 enterprises reported having intranet while 18.9 per cent had extranet. The use of cloud computing as a way of delivering information technology services was found to be very low among enterprises with only 22.9 per cent reporting to have used it in 2015.

The use of mobile phones has become important for promoting business activity. The survey therefore sought to establish the use of the device among enterprises. The survey findings indicate that 85.7 per cent of enterprises had mobile phones and 77.8 per cent of these enterprises used it to receive orders compared to 72.4 per cent that placed order using mobile phones in 2015. Further, about a third of the enterprises reported to have mobile banking platform. In contrast, 50.5 per cent of the enterprises reported to have a dedicated fixed telephone line out of which 69.0 per cent and 56.2 per cent received and placed orders using it, respectively. The use of facsimile was very low with 11.3 per cent of enterprises having it. Out of those who had a fax, 27.4 per cent and 22.4 per cent of the enterprises used it to receive and place orders, respectively.

Overall, about 4 in 10 enterprises had Information Technology policies in place. Similarly, the proportion of enterprises that were aware of methods of disposing electronic waste was low at 37.8 per cent while e-waste management policy was reported to have been put in place by only 37.0 per cent of the enterprises.

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Table A: Summary of Survey Findings by Enterprise Size

	Micro	Small	Medium	Large	Overall
Count (Total Number)	**1,365**	**1,304**	**556**	**305**	**3,530**
CORE INDICATORS	**Per cent**				
B1: Proportion of enterprises using a computer	84.0	95.9	99.1	98.0	**92.1**
B2: Proportion of persons employed routinely using a computer	81.0	91.2	94.4	84.9	**87.2**
B3: Proportion of enterprises using Internet	84.8	92.9	95.7	92.1	**90.2**
B4: Proportion of persons employed routinely using Internet	85.1	92.9	95.7	92.1	**88.4**
B5: Proportion of enterprises with website	33.5	52.5	70.7	79.3	**50.3**
B6: Proportion of enterprises with Intranet	25.3	40.2	59.4	65.2	**39.6**
B7: Proportion of enterprises receiving orders over the Internet	22.5	27.1	31.7	31.8	**26.5**
B8: Proportion of enterprises placing orders over the Internet	25.3	35.0	39.2	43.9	**32.7**
B9: Proportion of enterprises using the Internet by type of access:					
Fixed broadband	71.5	80.4	92.2	97.3	**81.3**
Mobile broadband	46.6	40.3	33.8	33.9	**40.5**
B10: Proportion of enterprises with LAN	40.8	63.0	84.5	93.1	**60.4**
B11: Proportion of enterprises with extranet	11.8	17.1	29.9	38.4	**18.9**
B12: Proportion of enterprises using the Internet by type of activity:					
Internet banking	21.0	35.3	53.8	67.2	**35.4**
Accessing other financial services	19.4	34.0	52.2	58.0	**33.3**
Staff training	17.1	30.0	44.2	49.5	**28.9**
Sending or receiving email	81.2	92.1	95.3	95.7	**88.7**

Table A: Summary of Survey Findings by Enterprise Size

	Micro	Small	Medium	Large	Overall
Count (Total Number)	**1,365**	**1,304**	**556**	**305**	**3,530**
CORE INDICATORS	**Per cent**				
Telephoning over the Internet/ VoIP including video conferencing VoIP	16.7	29.1	36.0	47.9	**27.0**
Use of instant messaging such as WhatsApp, bulletin boards for enterprise purpose	47.6	54.3	56.1	60.7	**52.5**
Getting information about goods or services but not from government website	44.1	56.9	66.7	71.5	**54.8**
Tracking of goods and services	21.8	34.2	45.9	61.0	**33.6**
Internal or external recruitment	13.6	25.2	41.4	51.5	**25.5**
Delivering products online	10.7	16.9	22.5	30.5	**16.6**
Providing customer services	28.1	37.4	46.6	47.5	**36.1**
Advertising	29.2	41.6	52.0	56.4	**39.7**
Research	32.2	41.8	49.3	51.1	**40.1**
Data collection	21.8	31.2	38.7	41.6	**29.7**
Country Specific Indicators					
Proportion of enterprises with mobile phone	78.8	87.6	93.7	93.4	**85.7**
Proportion of enterprises with mobile banking platform	25.6	29.8	33.3	35.1	**29.2**
Proportion of enterprises with fixed telephone	34.0	51.7	72.1	80.3	**50.5**
Proportion of enterprises with fax	6.1	11.2	17.8	23.3	**11.3**
Proportion of enterprises with Internet in their premises	70.9	89.4	97.3	97.7	**84.2**
Proportion of enterprises with email address	80.1	90.6	95.5	94.8	**87.7**
Proportion of enterprises with information Technology Policy	20.7	37.0	57.6	72.5	**37.0**
Proportion of enterprises with ICT security Policy	21.9	35.3	56.7	71.8	**36.6**

Table A: Summary of Survey Findings by Enterprise Size

	Micro	Small	Medium	Large	Overall
Count (Total Number)	**1,365**	**1,304**	**556**	**305**	**3,530**
CORE INDICATORS	**Per cent**				
Proportion of enterprises with e-waste management policy	30.4	35.2	44.6	42.6	**37.0**
Proportion of enterprises engaged in e-commerce	32.3	41.5	44.8	47.5	**39.0**
Proportion of enterprises accessing Internet elsewhere	16.4	6.7	1.6	0.7	**9.1**
Proportion of enterprises receiving orders via mobile	76.8	80.4	79.3	68.2	**77.8**
Proportion of enterprises placing orders via mobile	71.3	75.6	74.3	60.4	**72.4**
Proportion of enterprises receiving orders via fixed telephone	63.8	70.7	74.7	65.0	**69.0**
Proportion of enterprises placing orders via fixed telephone	47.1	56.7	65.9	55.8	**56.2**
Proportion of enterprises receiving orders via fax	30.2	27.2	27.7	23.9	**27.4**
Proportion of enterprises placing orders via fax	25.0	23.1	22.8	17.1	**22.4**
Proportion of enterprises receiving orders via email	53.3	67.6	78.7	84.3	**65.8**
Proportion of enterprises placing orders via email	55.8	70.1	82.9	86.7	**68.5**
Proportion of enterprises using cloud computing	14.5	22.9	35.3	38.7	**22.9**
Proportion of enterprises using specialized applications for human resource	13.8	26.0	45.9	57.0	**27.1**
Proportion of enterprises hosting website locally	64.0	64.0	54.2	57.0	**60.9**
Proportion of enterprises hosting website internationally	32.7	33.5	44.0	41.3	**36.7**
Proportion of enterprises using any type of e-government services	88.0	94.4	97.3	98.0	**92.7**
Proportion of enterprises experienced attack by virus	25.4	30.1	31.8	35.7	**29.0**
Proportion of enterprises aware on methods of disposing electronic waste	26.3	36.8	53.6	64.3	**37.8**

Table B: Summary of Survey Findings- By ISIC

CORE INDICATORS	Agriculture, forestry and fishing*	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support service activities	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Overall
Count (Total Number)	**118**	**8**	**486**	**16**	**9**	**213**	**1,189**	**203**	**263**	**159**	**116**	**134**	**289**	**166**	**33**	**39**	**26**	**63**	**3,530**
	Per cent																		
B1: Proportion of enterprises using a computer	97.5	100.0	97.1	100.0	88.9	91.5	83.9	98.0	90.2	99.4	97.3	95.5	99.0	98.8	100.0	100.0	92.3	85.7	**92.1**
B2: Proportion of persons employed routinely using a computer	94.9	87.5	91.8	93.8	66.7	86.9	79.2	92.6	83.7	94.4	95.6	88.1	96.2	95.8	93.9	95.0	80.8	1.0	**87.2**
B3: Proportion of enterprises using Internet	93.2	87.5	90.1	93.8	88.9	92.5	82.5	93.6	85.2	93.1	95.6	87.3	94.5	94.0	90.9	90.0	88.5	90.5	**90.2**
B4: Proportion of persons employed routinely using Internet	95.8	100.0	92.6	100.0	100.0	93.4	83.5	95.1	88.3	96.9	96.5	91.8	95.2	96.4	90.9	92.5	88.5	93.7	**88.4**
B5: Proportion of enterprises with website	67.8	62.5	54.9	62.5	66.7	30.5	31.1	62.1	62.1	83.1	73.5	47.0	66.1	68.9	72.7	57.5	53.8	60.3	**50.3**
B6: Proportion of enterprises with Intranet	50.8	62.5	45.9	62.5	33.3	31.5	27.5	60.6	41.7	54.4	58.4	37.3	43.6	47.3	39.4	47.5	50.0	28.6	**39.6**
B7: Proportion of enterprises receiving orders over the Internet	22.9	0.0	27.0	31.3	22.2	22.1	21.0	29.1	36.0	40.6	25.7	29.1	28.4	36.5	27.3	20.0	34.6	27.0	**26.5**
B8: Proportion of enterprises placing orders over the Internet	27.1	12.5	36.4	50.0	33.3	23.5	28.7	33.0	35.2	56.3	40.7	23.9	34.9	38.9	24.2	30.0	34.6	30.2	**32.7**
B9: Proportion of enterprises using the Internet by type of access																			
Fixed broadband	90.0	100.0	84.1	80.0	87.5	63.9	72.7	89.6	84.7	95.6	88.8	83.1	85.2	91.7	70.0	83.3	90.9	75.0	**81.3**
Mobile broadband	37.3	25.0	36.7	53.3	50.0	55.4	45.8	40.4	38.4	27.2	32.7	31.4	39.0	33.3	60.0	41.7	36.4	50.0	**40.5**
B10:Proportion of enterprises with LAN	82.2	100.0	70.8	50.0	44.4	38.5	46.0	80.8	59.1	85.0	79.6	65.7	68.2	73.1	66.7	52.5	69.2	46.0	**60.4**
B11: Proportion of enterprises with extranet	26.3	12.5	19.5	18.8	11.1	11.3	11.0	28.6	22.0	38.1	41.6	16.4	20.1	27.5	27.3	27.5	11.5	12.7	**18.9**
B12: Proportion of enterprises using the Internet by type of activity:																			
Internet banking	50.0	50.0	44.4	37.5	11.1	23.9	27.1	43.3	29.9	47.5	55.8	36.6	41.2	38.9	30.3	35.0	38.5	28.6	**35.4**
Accessing other financial services	38.1	50.0	40.5	43.8	33.3	28.6	26.5	37.9	30.3	50.0	59.3	32.8	35.3	25.7	27.3	30.0	30.8	33.3	**33.3**
Staff training	32.2	37.5	29.2	50.0	22.2	16.0	20.3	34.0	35.2	60.0	53.1	26.9	32.9	29.9	39.4	30.0	23.1	36.5	**28.9**
Sending or receiving email	90.7	100.0	93.8	87.5	100.0	93.9	80.6	95.6	86.0	93.8	95.6	90.3	95.2	94.6	93.9	92.5	88.5	87.3	**88.7**

Table B: Summary of Survey Findings- By ISIC

CORE INDICATORS	Agriculture, forestry and fishing*	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support service activities	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Overall
Count (Total Number)	**118**	**8**	**486**	**16**	**9**	**213**	**1,189**	**203**	**263**	**159**	**116**	**134**	**289**	**166**	**33**	**39**	**26**	**63**	**3,530**
	Per cent																		
Telephoning over the Internet/ VoIP including video conferencing VoIP	30.5	50.0	28.4	37.5	33.3	18.8	16.1	31.5	28.0	61.3	40.7	23.1	39.1	32.9	42.4	32.5	30.8	30.2	**27.0**
Use of instant messaging such as WhatsApp, bulletin boards for enterprise purpose	53.4	50.0	49.6	56.3	44.4	58.7	48.7	60.1	47.7	65.6	52.2	48.5	60.2	58.1	60.6	45.0	61.5	44.4	**52.5**
Getting information about goods or services but not from government website	61.0	62.5	62.1	56.3	44.4	60.1	44.9	65.5	45.1	76.3	65.5	45.5	62.3	62.9	48.5	55.0	50.0	54.0	**54.8**
Tracking of goods and services	45.8	37.5	39.5	31.3	22.2	28.2	28.3	71.9	19.7	47.5	33.6	17.2	34.3	35.3	21.2	20.0	19.2	31.7	**33.6**
Internal or external recruitment	38.1	25.0	28.6	18.8	22.2	12.7	13.9	29.1	26.1	55.6	46.9	26.9	36.7	33.5	39.4	27.5	26.9	30.2	**25.5**
Delivering products online	20.3	0.0	16.9	12.5	11.1	8.9	10.7	19.7	18.9	35.6	30.1	15.7	23.2	20.4	21.2	17.5	19.2	12.7	**16.6**
Providing customer services	32.2	25.0	37.2	37.5	22.2	22.5	27.8	48.3	41.7	66.3	55.8	30.6	43.6	41.3	27.3	35.0	34.6	36.5	**36.1**
Advertising	37.3	12.5	38.5	25.0	44.4	26.8	30.8	40.9	59.1	60.6	53.1	44.0	41.2	51.5	54.5	47.5	50.0	44.4	**39.7**
Research	41.5	25.0	41.2	18.8	22.2	37.6	27.5	43.8	39.4	63.8	56.6	36.6	62.6	47.3	60.6	50.0	50.0	49.2	**40.1**
Data collection	37.3	12.5	30.0	25.0	22.2	25.8	21.6	31.5	27.7	50.6	50.4	24.6	39.4	34.7	39.4	32.5	34.6	36.5	**29.7**
Accounts/ Finance, HR, Back Office & Logistics Services	.8	0.0	.6	0.0	0.0	0.0	.2	1.0	.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
Country Specific Indicators																			
Proportion of enterprises with mobile phone	87.3	87.5	90.3	87.5	88.9	81.7	81.4	94.1	90.2	81.3	89.4	79.9	86.5	89.2	97.0	95.0	80.8	87.3	**85.7**
Proportion of enterprises with mobile banking platform	23.7	25.0	30.0	25.0	33.3	31.0	27.1	25.6	35.2	33.8	43.4	20.1	30.1	29.9	39.4	25.0	30.8	25.4	**29.2**
Proportion of enterprises with fixed telephone	61.9	87.5	58.0	37.5	44.4	37.6	39.5	64.5	43.2	68.8	69.9	59.7	56.7	59.3	48.5	57.5	42.3	57.1	**50.5**
Proportion of enterprises with fax	12.7	12.5	14.0	6.3	22.2	6.6	9.1	19.7	8.7	12.5	22.1	11.9	11.4	12.0	6.1	5.0	7.7	11.1	**11.3**

Table B: Summary of Survey Findings- By ISIC

CORE INDICATORS	Agriculture, forestry and fishing*	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support service activities	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Overall
Count (Total Number)	**118**	**8**	**486**	**16**	**9**	**213**	**1,189**	**203**	**263**	**159**	**116**	**134**	**289**	**166**	**33**	**39**	**26**	**63**	**3,530**
	Per cent																		
Proportion of enterprises with Internet in their premises	93.2	100.0	93.0	93.8	88.9	77.9	71.4	95.1	82.2	99.4	92.0	88.1	95.8	94.0	90.9	92.5	84.6	82.5	**84.2**
Proportion of enterprises with email address	92.4	100.0	93.2	93.8	77.8	92.0	80.6	94.6	85.2	95.6	92.9	85.8	94.8	92.2	78.8	85.0	76.9	82.5	**87.7**
Proportion of enterprises with information Technology Policy	57.6	87.5	40.9	50.0	33.3	22.5	27.2	54.7	35.6	61.3	61.9	35.1	37.7	35.3	36.4	42.5	34.6	38.1	**37.0**
Proportion of enterprises with ICT security Policy	57.4	87.5	40.3	60.0	44.4	22.5	28.0	48.7	33.7	63.9	57.5	33.6	39.8	35.0	34.5	37.5	30.8	31.1	**36.6**
Proportion of enterprises with e-waste management policy	55.9	60.0	37.2	36.4	25.0	33.3	29.5	40.6	33.0	51.0	46.6	24.1	39.3	36.2	20.0	53.3	30.0	39.1	**37.0**
Proportion of enterprises engaged in e-commerce	32.2	12.5	40.9	50.0	33.3	31.0	33.2	39.9	45.1	63.1	44.2	34.3	44.6	49.1	30.3	35.0	46.2	36.5	**39.0**
Proportion of enterprises accessing Internet elsewhere	1.7	0.0	4.3	0.0	11.1	17.4	15.4	3.0	11.8	0.6	4.3	6.7	2.4	2.4	9.1	5.1	7.7	12.7	**9.1**
Proportion of enterprises receiving orders via mobile	54.4	57.1	85.4	71.4	62.5	71.3	83.8	75.9	91.5	76.6	58.3	62.6	64.6	77.7	61.3	68.4	90.0	64.8	**77.8**
Proportion of enterprises placing orders via mobile	56.3	57.1	77.3	42.9	57.1	66.9	79.9	68.6	83.0	70.1	50.0	54.2	60.7	75.3	63.3	68.4	61.9	66.7	**72.4**
Proportion of enterprises receiving orders via fixed telephone	39.4	28.6	76.8	80.0	75.0	64.6	73.3	67.2	86.7	69.1	60.0	67.5	57.7	70.5	50.0	69.6	54.5	57.1	**69.0**
Proportion of enterprises placing orders via fixed telephone	42.9	57.1	67.4	60.0	75.0	55.8	58.4	55.0	67.9	50.0	47.9	49.4	46.8	52.1	33.3	59.1	27.3	50.0	**56.2**
Proportion of enterprises receiving orders via fax	37.5	100.0	15.9	0.0	50.0	35.7	33.3	19.5	44.0	20.0	28.0	26.7	33.3	14.3	50.0	50.0	50.0	0.0	**27.4**
Proportion of enterprises placing orders via fax	31.3	100.0	14.7	0.0	0.0	28.6	29.2	19.0	20.8	14.3	24.0	13.3	30.3	15.0	0.0	50.0	50.0	0.0	**22.4**
Proportion of enterprises receiving orders via email	85.7	87.5	79.3	73.3	55.6	45.4	59.5	75.9	65.7	79.4	59.6	58.6	66.0	76.4	54.5	46.2	41.7	51.7	**65.8**

Table B: Summary of Survey Findings- By ISIC

CORE INDICATORS	Agriculture, forestry and fishing*	Mining and quarrying	Manufacturing	Electricity, gas, steam and air conditioning	Water supply; sewerage, waste management and remediation activities	Construction	Wholesale and retail trade; repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific and technical activities	Administrative and support service activities	Education	Human health and social work activities	Arts, entertainment and recreation	Other service activities	Overall
Count (Total Number)	**118**	**8**	**486**	**16**	**9**	**213**	**1,189**	**203**	**263**	**159**	**116**	**134**	**289**	**166**	**33**	**39**	**26**	**63**	**3,530**
	Per cent																		
Proportion of enterprises placing orders via email	88.4	100.0	81.0	80.0	55.6	55.1	65.6	72.4	58.9	81.3	62.4	58.6	66.0	73.9	63.6	64.1	45.8	63.3	**68.5**
Proportion of enterprises using cloud computing	34.7	37.5	25.1	18.8	11.1	20.2	15.7	29.6	19.7	46.3	31.9	21.6	28.0	21.0	33.3	17.5	30.8	28.6	**22.9**
Proportion of enterprises using specialized applications for human resource	47.5	50.0	34.0	37.5	33.3	16.4	15.2	44.3	29.2	46.3	45.1	26.9	25.3	29.9	39.4	32.5	34.6	33.3	**27.1**
Proportion of enterprises hosting website locally	52.5	60.0	63.7	60.0	66.7	73.8	65.5	62.7	54.3	49.6	63.9	63.5	60.2	55.7	54.2	73.9	64.3	57.9	**60.9**
Proportion of enterprises hosting website internationally	46.3	40.0	33.0	40.0	16.7	23.1	31.8	36.5	43.3	48.9	33.7	34.9	37.7	41.7	41.7	21.7	28.6	42.1	**36.7**
Proportion of enterprises using any type of e-government services	93.2	100.0	97.3	93.8	100.0	93.4	88.7	96.6	91.3	95.6	94.8	96.3	95.2	92.8	87.9	89.7	96.2	92.1	**92.7**
Proportion of enterprises experienced attack by virus	34.7	12.5	28.8	18.8	22.2	34.7	24.9	32.5	31.8	30.0	26.5	27.6	33.2	32.9	48.5	30.0	26.9	27.0	**29.0**
Proportion of enterprises aware on methods of disposing electronic waste	56.8	62.5	42.2	62.5	33.3	28.2	28.0	48.8	35.6	62.5	49.6	38.1	43.9	38.9	42.4	35.0	38.5	31.7	**37.8**

Chapter 1

Introduction

Chapter 1. Introduction

1.1 Background

Over the recent past, Kenya has been focusing on transforming herself into a knowledge-based economy that relies on the production, distribution, and use of information technologies to enhance service delivery. Information and Communication Technology has played a fundamental role both as an innovative economic sector and a catalyst for other sectors. The Government identified ICT as a key enabler to the achievement of Vision 2030 goals and aspirations that will transform Kenya into a knowledge and information based economy by enabling access to quality, affordable and reliable ICT services in the country. The government has put in place regulatory frameworks and guidelines for boosting ICT usage among all sectors of the economy. These guidelines include the National Broadband Strategy (NBS), the National Optical Fiber Backbone Infrastructure (NOFBI) and the cyber security initiatives that promote and stir the growth of the ICT sector.

The tremendous development of ICTs accelerates the attainment of the Sustainable Development Goals (SDGs) through e-commerce, e-agriculture, e-health, use of cloud computing, etc. The 2030 Agenda for Sustainable Development states that "the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and develop knowledge societies." To further strengthen the development of the ICT sector and also measure ICTs impact on the SDGs, relevant and up-to-date data is required for evidence based decision making. Against this background, the Kenya National Bureau of Statistics (KNBS) and the Communications Authority of Kenya (CA) collaborated in conducting the Enterprise ICT Survey 2016. United Nations Conference on Trade and Development (UNCTAD) provided technical assistance in the survey implementation. It is expected that the statistics obtained from the survey will enhance formulation of the ICT related policies geared towards attracting foreign investors, generation of new businesses and employment opportunities, measure related indicators in SDGs, and improve competitiveness.

1.2 Justification

There have been significant changes over the past years in the country's ICT industry in terms of products and services. However, there has not been a dedicated ICT survey to measure access to and use of ICT in enterprises. The Enterprise ICT Survey 2016 aimed at providing comprehensive information on ICT.

1.3 Objectives of the Survey

The main objective of the survey was to measure access to and use of ICTs in enterprises. The specific objectives of the survey were to;

a) Measure the availability of ICT in enterprises

b) Measure the access to ICT in enterprises

c) Measure the use of ICT infrastructure and its applications by enterprises

d) Measure the penetration of e-commerce in enterprises

e) Establish the existence of internal ICT policies in enterprises

f) Generate ICT baseline indicators for enterprises

1.4 Legal, Regulatory and Institutional Framework

The Enterprise ICT survey 2016 was conducted under the Statistics Act, 2006. The Act empowers KNBS to collect, compile, analyse, publish and disseminate statistical information, and to co-ordinate the National Statistical System. The Act provides for confidentiality of information provided by the respondents. The National Statistical System (NSS) comprises of government ministries, departments and agencies and users of official statistics. The Act encourages collaboration among institution for the purpose of producing and promoting the use of statistical information.

Chapter 2

Survey Methodology

Chapter 2. Survey Methodology

2.1 Survey Design

The Enterprises ICT Survey 2016 was designed to provide reliable estimates on access to and usage of ICTs in enterprises at the national level in line with UNCTAD manual for the production of statistics on information economy. In addition, a number of indicators were adopted and domesticated from Organisation for Economic Co-operation and Development (OECD) and Eurostat manuals to respond to local needs.

The survey covered all the divisions of the sections of ISIC Rev 4 except in section A (Agricultural, forestry and fishing) where only horticultural enterprises were included. Enterprises were then categorised by size as follows; micro (1-9 employees), small (10-49 employees), medium (50-249 employees) and large (250 or more employees).

The survey adopted a stratified random sampling methodology for the selection of enterprises from which data was collected. The design of the survey used a representative probability sample to produce national level estimates. A systematic random sample of 4,000 enterprises was selected to represent all the enterprises in the targeted economic sectors. Before the selection of enterprises, allocation of the sample to each stratum was done using the power allocation method based on the number of enterprises per stratum. A specified number of enterprises were selected independently within each stratum using equal probability selection method. Sampling of the enterprises was undertaken by KNBS at the office before teams embarked on data collection. Table 2.1 shows the distribution of the sampled enterprises from the KNBS business register by ISIC categorization. Stratification of the frame followed the economic sectors where the ISIC section code was used as the stratification variable. Prior to selection, the enterprises in the frame were arranged according to Counties and other geographical locations, which provided implicit stratification.

Table 2. 1: Distribution of Sampled Enterprises

S/No	ISIC Section Code	Economic Activity	Number of sampled enterprises
1	A	Agriculture, forestry and fishing (Horticulture only)	150
2	B	Mining and quarrying	57
3	C	Manufacturing	570
4	D	Electricity, gas, steam and air conditioning supply	17
5	E	Water supply; sewerage, waste management and remediation activities	20
6	F	Construction	255
7	G	Wholesale and retail trade	1,200
8	H	Transportation and storage	231
9	I	Accommodation and food service activities	275
10	J	Information and communication	178
11	K	Financial and insurance activities	119
12	L	Real estate	142
13	M	Professional, scientific and technical activities	299
14	N	Administrative and support service activities	200
15	P	Education	43
16	Q	Human health and social work activities	86
17	R	Arts, entertainment and recreation	56
18	S	Other service activities	102
Total			**4,000**

2.2 Survey Instruments

A technical team from KNBS, Communications Authority of Kenya and UNCTAD developed data collection instruments comprising of the questionnaire and survey manual. A stakeholder workshop was held to review the survey instruments. The participants included representatives from Government Ministries, Departments, Agencies and the private sector.

The Enterprise ICT Survey 2016 used an enterprise questionnaire, which was administered to private enterprises (*accessible on www.knbs.or.ke*). The information collected included the following:

- General information of the enterprise
- Use of ICT infrastructure
- Ownership, access and use of Internet, intranet and extranet
- Use of mobile applications
- Use of communication applications
- Use of online applications
- Existence of IT, ICT security and e-waste management policies
- Expenditure on ICT in enterprises
- Perception of enterprises on the use of ICTs

2.3 Training

To ensure consistency and quality of data collected, an instructions' manual was developed for training and reference by survey personnel. It contained instructions on how to administer the questionnaire and definition of concepts. The training took place from 5th to 9th February, 2016. A total of 100 data collection personnel including supervisors and interviewers were trained.

2.4 Data Collection

Data collection was conducted for 50 days from 23rd February to 6th May 2016 using paper questionnaires. The fieldwork procedures involved introduction and explanation of questionnaire contents and concepts to the respondents, face-to-face interviews and follow-up to collect the completed questionnaires. A total of eighty-one (81) research assistants, grouped into twenty-seven teams, were deployed to administer the questionnaires. The deployment of teams was done according to the number of sampled enterprises in a particular County. To enhance the response rate, public awareness and sensitization workshop was held and press advertisements were placed in the local dailies.

2.5 Data Processing

Data processing entailed editing, entry, cleaning and analysis. Data entry was done using CSPro software, Version 6.2 running on desktop computers. Data editing guidelines were developed for use by the editing personnel. To minimize errors and to ensure data quality, all questionnaires were double-entered and internal consistency checks performed. Data editing which involved consistency checks in the questionnaires were done concurrently with data entry.

Data cleaning and validation involved elimination of duplicates and recoding of missing ISIC codes in the dataset. All similar responses in the 'other specify' category in the dataset were merged and coded for ease of analysis. Data validation was based on edit specifications which were used to check for structural and internal data inconsistencies resulting from response errors. Data were analysed using the Statistical Package for Social Sciences (SPSS) software, Version 21. The generation of tables was guided by a tabulation plan.

2.6 Response Rate

ICT Survey 2016 targeted a total of 4,000 enterprises out of which 3,530 enterprises responded translating to an overall response rate of 88.3 per cent as shown in Table 2.2.

Table 2. 2: Number of Enterprises that Responded by Economic Activity

ISIC Section Code	Economic Activity	Number of Sampled enterprises	Number of Responses	Response Rate (Per cent)
A	Agriculture, forestry and fishing (Horticulture only)	150	118	78.7
B	Mining and quarrying	57	8	14.0
C	Manufacturing	570	486	85.3
D	Electricity, gas, steam and air conditioning supply	17	16	94.1
E	Water supply; sewerage, waste management and remediation	20	9	45.0
F	Construction	255	213	83.5
G	Wholesale and retail trade	1,200	1,189	99.1
H	Transportation and storage	231	203	87.9
I	Accommodation and food service activities	275	263	95.6
J	Information and communication	178	159	89.3
K	Financial and insurance	119	116	97.5
L	Real estate	142	134	94.4
M	Professional, scientific and technical	299	289	96.7
N	Administrative and support service	200	166	83.0
P	Education	43	33	76.7
Q	Human health and social work	86	39	45.3
R	Arts, entertainment and recreation	56	26	46.4
S	Other service	102	63	61.8
Total		**4,000**	**3,530**	**88.3**

Table 2.3 shows the distribution of firms by region and firm size. Nairobi contributed the highest proportion of enterprises.

Table 2. 3: Response by Region and Firm Size

Region	Micro	Small	Medium	Large	Total
Central	86	99	64	46	**295**
Central Rift	85	79	47	42	**253**
Coast	104	136	72	37	**349**
Lower Eastern	32	29	13	9	**83**
Nairobi	719	731	313	130	**1,893**
North Eastern	4	4	0	0	**8**
North Rift	60	44	9	9	**122**
Nyanza	97	83	19	16	**215**
South Rift	32	26	3	4	**65**
Upper Eastern	109	34	8	9	**160**
Western	37	39	8	3	**87**
Total	**1,365**	**1,304**	**556**	**305**	**3,530**

Chapter 3

Use of ICT Equipment and Devices

Chapter 3. Use of ICT Equipment and Devices

3.1 Use of Telephones

The telephone is one invention that changed the world and opened a worldwide of communication. As communication continues to evolve, businesses continue to benefit from the additional communication channels that make completing business transactions easier. The change of telephones from landlines and switchboards to cell phones and cell towers has shaped the way businesses connect to individuals and has made it easier to reach a wider range of audience.

3.2 Use of Mobile Phones

3.2.1 Enterprises with Mobile Phones

Overall, 85.7 per cent of the enterprises reported to have had a business mobile phone in 2015 as shown in Table 3.1. The highest proportion of enterprises with mobile phones were medium enterprises (93.7 per cent) and large enterprises (93.4 per cent). About 4 in every 5 of the micro enterprises had mobile phones.

A sectoral analysis shows that the highest proportion of enterprises with mobile phones was in education (97.0 per cent), followed by human health and social work (94.9 per cent) and Transportation and storage (94.1 per cent). The sectors with the lowest proportion of enterprises with business mobile phones were Real estate (79.9 per cent) and arts, entertainment and recreation (80.8 per cent).

Table 3. 1: Proportion of Enterprises with a Dedicated Business Mobile Phone

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	40.0	80.0	81.5	94.4	**87.3**
Mining and quarrying	100.0	100.0	80.0	100.0	**87.5**
Manufacturing	83.8	86.8	93.8	95.7	**90.3**
Electricity, gas, steam and air conditioning supply	66.7	100.0	100.0	0.0	**87.5**
Water supply; sewerage, waste management and remediation	100.0	66.7	0.0	100.0	**88.9**
Construction	75.0	84.8	88.0	85.7	**81.7**
Wholesale and retail trade	75.7	86.0	93.5	84.4	**81.4**
Transportation and Storage	88.1	93.8	100.0	100.0	**94.1**
Accommodation and food service activities	84.2	87.3	100.0	100.0	**90.1**
Information and communication	74.6	84.7	91.3	80.0	**81.1**
Financial and insurance activities	82.1	90.2	96.2	90.0	**88.8**
Real estate	73.5	87.0	88.9	66.7	**79.9**
Professional, scientific and technical activities	81.8	91.6	100.0	100.0	**86.5**
Administrative and support service activities	87.5	92.2	89.5	93.8	**89.8**
Education	91.7	100.0	100.0	100.0	**97.0**
Human health and social work activities	90.0	100.0	100.0	100.0	**94.9**
Arts, entertainment and recreation	66.7	90.9	83.3	0.0	**80.8**
Other service activities	91.7	81.0	88.9	88.9	**87.3**
Total	**78.8**	**87.6**	**93.7**	**93.4**	**85.7**

3.2.2 Use of Mobile Phones in Receiving Orders

Overall, 77.3 per cent of enterprises received orders using mobile phones as shown in Table 3.2. The use of mobile phones for receiving orders was more evident in small and medium enterprises but comparatively lower in large enterprises.

The use of mobile phones for receiving orders across sectors was highest in accommodation and food service activities (89.9 per cent), arts, entertainment and recreation (85.7 per cent) and manufacturing activities (85.2 per cent). The proportion of enterprises using mobile phones to receive orders was lowest in agriculture, forestry and fishing (54.4 per cent), financial and insurance activities (56.3 per cent) and mining and quarrying (57.1 per cent).

Table 3. 2: Proportion of Enterprises Receiving Orders Using Mobile Phones

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	75.0	59.1	50.7	**54.4**
Mining and quarrying	100.0	100.0	50.0	0.0	**57.1**
Manufacturing	90.3	84.8	86.7	79.8	**85.2**
Electricity, gas, steam and air conditioning supply	50.0	100.0	50.0	0.0	**71.4**
Water Supply; sewerage, waste management and remediation	60.0	50.0	0.0	100.0	**62.5**
Construction	73.7	68.5	81.8	50.0	**71.3**
Wholesale and retail trade	81.2	87.8	86.2	77.8	**84.2**
Transportation and storage	82.7	84.0	67.5	50.0	**75.9**
Accommodation and food service activities	81.3	91.3	88.2	100.0	**89.9**
Information and communication	78.0	72.0	76.2	75.0	**75.2**
Financial and insurance activities	53.1	59.5	48.0	77.8	**56.3**
Real estate	60.0	68.1	62.5	0.0	**62.6**
Professional, scientific and technical activities	66.2	62.1	55.6	50.0	**63.6**
Administrative and support service activities	75.7	74.5	88.2	80.0	**77.2**
Education	54.5	73.3	50.0	0.0	**59.4**
Human health and social work activities	55.6	77.8	83.3	75.0	**67.6**
Arts, entertainment and recreation	83.3	90.0	80.0	0.0	**85.7**
Other service activities	81.8	52.9	50.0	50.0	**63.6**
Total	**76.1**	**80.3**	**78.7**	**67.7**	**77.3**

3.2.3 Use of Mobile Phones in Placing Orders

Overall, 71.7 per cent of enterprises placed orders using mobile phones as shown in Table 3.3. The use of mobile phones for placing orders was more common in small and medium than in large and micro enterprises. About three quarters of small and medium sized enterprises and 59.3 per cent of the large enterprises placed orders using mobile phones.

The highest proportion of enterprises that used mobile phones for placing orders were in accommodation and food service activities (82.3 per cent), Wholesale and retail trade (79.2 per cent) and manufacturing (77.4 per cent). On the other hand, the sectors that had lower proportions of enterprises placing orders using mobile phones were electricity, gas, steam and air conditioning (42.9 per cent), financial and insurance (47.6 per cent), water supply, sewerage, waste management and remediation activities (50.0 per cent), Real estate (54.2 per cent) and agriculture, forestry and fishing (56.3 per cent).

Table 3. 3: Proportion of Enterprises Placing Orders Using Mobile Phones

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	75.0	63.6	52.2	**56.3**
Mining and quarrying	100.0	100.0	50.0	0.0	**57.1**
Manufacturing	85.5	79.0	80.0	65.2	**77.4**
Electricity, gas, steam and air conditioning supply	50.0	50.0	25.0	0.0	**42.9**
Water supply; sewerage, waste management and remediation	60.0	50.0	0.0	0.0	**50.0**
Construction	63.2	66.3	81.8	66.7	**67.2**
Wholesale and retail trade	79.3	81.8	75.9	59.3	**79.2**
Transportation and storage	53.8	84.0	62.5	54.2	**67.5**
Accommodation and food service activities	68.8	83.3	86.3	87.5	**82.3**
Information and communication	74.0	64.0	71.4	50.0	**68.2**
Financial and insurance activities	46.9	51.4	44.0	44.4	**47.6**
Real estate	44.0	61.7	87.5	0.0	**54.2**
Professional, scientific and technical activities	58.3	64.4	61.1	33.3	**60.0**
Administrative and support service activities	75.7	72.3	76.5	66.7	**73.8**
Education	45.5	73.3	50.0	50.0	**59.4**
Human health and social work activities	61.1	55.6	100.0	75.0	**67.6**
Arts, entertainment and recreation	66.7	50.0	80.0	0.0	**61.9**
Other service activities	72.7	64.7	50.0	62.5	**65.5**
Total	**70.3**	**75.1**	**73.9**	**59.3**	**71.7**

3.2.4 Median Proportion of Orders Received Using Mobile Phones

The average proportion of orders received using mobile phones was 40.0 per cent as shown in Table 3.4. The median proportion of orders received was 40.0 per cent across all firm sizes. The highest proportion of orders received using mobile phones was in arts, entertainment and recreation (55.0 per cent), education (50.0 per cent) and manufacturing (50.0 per cent). Agriculture, forestry and fishing; electricity, gas, steam and air conditioning supply; and water supply, sewerage, waste management and remediation activities had the lowest proportion of orders being received through mobile phones at 30.0 per cent each.

Table 3. 4: Median/Average Proportion of Orders Received Using Mobile Phones

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	50.0	50.0	20.0	**30.0**
Mining and quarrying	20.0	30.0	32.0	0.0	**25.0**
Manufacturing	47.5	60.0	40.0	40.0	**50.0**
Electricity, gas, steam and air conditioning supply	25.0	50.0	22.0	0.0	**30.0**
Water supply; sewerage, waste management and remediation	30.0	30.0	0.0	70.0	**30.0**
Construction	50.0	30.0	40.0	55.0	**40.0**
Wholesale and retail trade	30.0	40.0	39.0	50.0	**35.0**
Transportation and storage	40.0	50.0	40.0	35.0	**40.0**
Accommodation and food service activities	40.5	40.0	42.5	40.0	**40.0**
Information and communication	45.0	40.0	50.0	20.0	**40.0**
Financial and insurance activities	55.0	45.0	40.0	13.5	**42.5**
Real estate	30.0	60.0	42.5	0.0	**45.0**
Professional, scientific and technical activities	40.0	40.0	60.0	15.0	**40.0**
Administrative and support service activities	50.0	40.0	27.5	25.0	**40.0**
Education	60.0	40.0	50.0	0.0	**50.0**
Human health and social work activities	30.0	30.0	40.0	10.0	**40.0**
Arts, entertainment and recreation	62.5	55.0	30.0	0.0	**55.0**
Other service activities	40.0	60.0	36.0	35.0	**40.0**
Total	**40.0**	**40.0**	**40.0**	**40.0**	**40.0**

3.2.5 Median Proportion of Orders Placed Using Mobile Phones

The average proportion of orders placed using mobile phones was 50.0 per cent as shown in Table 3.5. Large enterprises had the lowest proportion of orders placed using mobile phones at 40.0 per cent. The highest proportion of orders placed using mobile phones was recorded in water supply, sewerage, waste management and remediation activities at 80.0 per cent followed by that of arts, entertainment and recreation at 65.0 per cent. Mining and quarrying reported the lowest proportion of orders placed using mobile phones at 20.0 per cent.

Table 3. 5: Median/Average Proportion of Orders Placed Using Mobile Phones

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	30.0	70.0	30.0	**40.0**
Mining and quarrying	0.0	20.0	26.0	0.0	**20.0**
Manufacturing	50.0	60.0	50.0	40.0	**50.0**
Electricity, gas, steam and air conditioning supply	17.5	50.0	80.0	0.0	**37.5**
Water supply; sewerage, waste management and remediation	80.0	0.0	0.0	0.0	**80.0**
Construction	50.0	47.5	50.0	70.0	**50.0**
Wholesale and retail trade	50.0	50.0	41.0	40.0	**50.0**
Transportation and storage	50.0	50.0	30.0	65.0	**50.0**
Accommodation and food service activities	43.0	60.0	40.0	42.5	**50.0**
Information and communication	40.0	40.0	55.0	45.0	**40.0**
Financial and insurance activities	60.0	50.0	30.0	2.0	**47.5**
Real estate	40.0	50.0	40.0	0.0	**50.0**
Professional, scientific and technical activities	40.0	42.5	37.5	83.3	**40.0**
Administrative and support service activities	50.0	50.0	50.0	32.5	**50.0**
Education	50.0	47.5	75.0	5.0	**50.0**
Human health and social work activities	50.0	55.0	40.0	27.5	**50.0**
Arts, entertainment and recreation	80.0	50.0	60.0	0.0	**65.0**
Other service activities	40.0	50.0	45.0	15.0	**50.0**
Total	**50.0**	**50.0**	**50.0**	**40.0**	**50.0**

3.2.6 Use of Mobile Money Account

Mobile money account enables the transfer of money and also facilitates the users to access financial services using a mobile a phone. Mobile money accounts include; Mpesa, Airtel Money and Orange money. Overall, 73.3 per cent of all enterprises used a mobile money account in 2015 as presented in Table 3.6. The use of the mobile money account was high in all enterprises irrespective of size. The highest proportion of enterprises using mobile money account were medium enterprises at 75.9 per cent followed by small enterprises at 74.3 per cent.

Accommodation and food service activities posted the highest proportion of enterprises using mobile money account at 87.8 per cent. Significant proportion of enterprises in human health and social work (84.6 per cent); financial and insurance services (77.6 per cent); wholesale and trade (76.1 per cent); construction (75.1 per cent); and mining and quarrying (75.0 per cent) used mobile money account. The lowest proportion of enterprises using mobile money account were those engaged in Real estate and agriculture, forestry and fishing.

Table 3. 6: Proportion of Enterprises Using Mobile Money Account

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	40.0	73.3	59.3	53.5	**56.8**
Mining and quarrying	0.0	100.0	80.0	100.0	**75.0**
Manufacturing	68.9	66.0	71.9	67.7	**68.7**
Electricity, gas, steam and air conditioning supply	66.7	66.7	50.0	0.0	**62.5**
Water supply; sewerage, waste management and remediation	60.0	66.7	0.0	100.0	**66.7**
Construction	78.9	73.3	76.0	57.1	**75.1**
Wholesale and retail trade	73.5	79.3	75.8	84.4	**76.1**
Transportation and storage	83.1	67.5	85.0	62.5	**74.9**
Accommodation and food service activities	73.7	88.0	94.1	100.0	**87.8**
Information and communication	71.6	72.9	78.3	80.0	**73.6**
Financial and insurance activities	74.4	75.6	76.9	100.0	**77.6**
Real estate	50.0	50.0	66.7	33.3	**50.7**
Professional, scientific and technical activities	70.6	66.3	72.2	83.3	**69.6**
Administrative and support service activities	71.3	78.4	68.4	75.0	**73.5**
Education	75.0	60.0	75.0	100.0	**69.7**
Human health and social work activities	90.0	66.7	100.0	75.0	**84.6**
Arts, entertainment and recreation	55.6	81.8	83.3	0.0	**73.1**
Other service activities	62.5	66.7	66.7	88.9	**68.3**
Total	**71.9**	**74.3**	**75.9**	**70.2**	**73.3**

3.2.7 Enterprises with Mobile Payment Accounts

Mobile payment account refers to accounts that are used in receiving payments either at institutional level or at points of sale. Mobile payment accounts are used to receive payments but are not used to transfer money from one user to another while mobile money platform are used in the receiving and sending of money. The mobile payment accounts used by businesses are pay bill and till/ merchant numbers. Businesses usually use pay bill numbers where customers have an account with, in which they make payments to. Till/ merchant numbers on the other hand are meant for immediate purchase of goods and services and these payments are made on site and confirmed immediately. The buyer does not need to have an account number with the receiving business.

3.2.7.1 Enterprises with a Pay Bill Account

The proportion of enterprises that had a pay bill mobile money account in 2015 is presented in Table 3.7. Overall, 25.4 per cent of surveyed enterprises had pay bill accounts with 36.5 per cent and 36.4 per cent of medium and large enterprises reporting to have had it, respectively.

Analysis by economic activity indicate that the highest proportion of enterprises with pay bill accounts were engaged in information and communication activities at 45.7 per cent followed

by those in education and human health and social work activities at 41.0 per cent and 38.5 per cent, respectively followed this. The lowest proportion of enterprises with pay bill numbers were in financial and insurance, Real estate and construction activities.

Table 3. 7: Proportion of Enterprises with a Pay Bill Account

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	20.0	26.7	25.9	14.1	**18.6**
Mining and quarrying	0.0	0.0	0.0	0.0	**0.0**
Manufacturing	13.5	23.9	35.0	37.6	**28.6**
Electricity, gas, steam and air conditioning supply	0.0	50.0	0.0	0.0	**18.8**
Water supply; sewerage, waste management and remediation activities	0.0	33.3	0.0	100.0	**22.2**
Construction	21.1	16.2	12.0	14.3	**17.4**
Wholesale and retail trade	11.9	22.5	27.5	25.0	**20.7**
Transportation and storage	28.9	29.1	52.9	68.8	**36.1**
Accommodation and food service activities	13.4	25.4	30.4	60.0	**23.3**
Information and communication	25.6	41.5	61.5	100.0	**45.7**
Financial and insurance activities	4.4	18.5	44.4	0.0	**12.7**
Real estate	15.9	13.7	33.3	0.0	**15.9**
Professional, scientific and technical activities	23.8	39.2	42.1	37.5	**31.9**
Administrative and support service activities	0.0	26.7	50.0	100.0	**24.2**
Education	30.0	33.3	83.3	50.0	**41.0**
Human health and social work activities	22.2	45.5	50.0	0.0	**38.5**
Arts, entertainment and recreation	29.2	23.8	33.3	44.4	**30.2**
Other service activities	17.3	30.9	36.3	53.1	**25.1**
Total	**17.1**	**26.8**	**36.5**	**36.4**	**25.4**

3.2.7.2 Enterprises with a Till /Merchant Account

The proportion of enterprises that reported to have till/merchant accounts was quite low at 16.0 per cent as shown in Table 3.8.Medium enterprises had the highest proportion of those that had till/merchant accounts at 20.3 per cent while micro enterprises recorded the lowest proportion of those with the accounts at 13.0 per cent.

A significant proportion of enterprises with till/merchant accounts were in accommodation and food service activities at 34.2 per cent.

Table 3. 8: Proportion of Enterprises with Till/Merchant Accounts

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	20.0	3.7	2.8	**5.1**
Mining and quarrying	0.0	0.0	0.0	0.0	**0.0**
Manufacturing	9.5	11.9	13.8	18.3	**13.4**
Electricity, gas, steam and air conditioning supply	16.7	0.0	25.0	0.0	**12.5**
Water supply; sewerage, waste management and remediation activities	0.0	0.0	0.0	0.0	**0.0**
Construction	11.8	3.8	12.0	14.3	**8.0**
Wholesale and retail trade	19.1	25.2	32.3	28.1	**22.9**
Transportation and storage	0.0	10.0	7.5	8.3	**6.4**
Accommodation and food service activities	21.1	35.4	39.2	37.5	**34.2**
Information and communication	9.0	8.5	21.7	10.0	**10.7**
Financial and insurance activities	10.3	12.2	15.4	10.0	**12.1**
Real estate	1.5	7.4	33.3	0.0	**6.0**
Professional, scientific and technical activities	5.9	5.3	5.6	0.0	**5.5**
Administrative and support service activities	10.0	15.7	26.3	18.8	**14.5**
Education	8.3	0.0	0.0	0.0	**3.0**
Human health and social work activities	15.0	11.1	33.3	25.0	**17.9**
Arts, entertainment and recreation	22.2	27.3	16.7	0.0	**23.1**
Other service activities	4.2	9.5	22.2	11.1	**9.5**
Total	**13.0**	**17.6**	**20.3**	**14.4**	**16.0**

3.2.8 Enterprises with Mobile Money Account

Enterprises with mobile money accounts such as tangaza, mpesa and equitel accounted for 9.9 per cent of all surveyed enterprises with minor differences across all sectors and enterprise sizes as presented in Table 3.9. The highest proportion of enterprises with the platform was reported in mining and quarrying at 37.5 per cent.

Table 3. 9: Proportion of Enterprises with Mobile Money Account

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing	0.0	13.3	14.8	5.6	**8.5**
Mining and quarrying	0.0	0.0	60.0	0.0	**37.5**
Manufacturing	9.5	11.3	6.3	6.5	**8.4**
Electricity, gas, steam and air conditioning supply	0.0	0.0	25.0	0.0	**6.3**
Water supply; sewerage, waste management and remediation activities	0.0	0.0	0.0	0.0	**0.0**
Construction	14.5	11.4	20.0	0.0	**13.1**
Wholesale and retail trade	10.9	10.5	6.5	12.5	**10.3**
Transportation and storage	5.1	8.8	7.5	16.7	**8.4**
Accommodation and food service activities	15.8	13.9	7.8	6.3	**12.5**
Information and communication	9.0	8.5	13.0	10.0	**9.4**
Financial and insurance activities	12.8	4.9	11.5	30.0	**11.2**
Real estate	7.4	0.0	33.3	0.0	**6.0**
Professional, scientific and technical activities	8.8	12.6	16.7	0.0	**10.4**
Administrative and support service activities	3.8	5.9	5.3	18.8	**6.0**
Education	8.3	20.0	0.0	0.0	**12.1**
Human health and social work activities	25.0	0.0	16.7	0.0	**15.4**
Arts, entertainment and recreation	0.0	9.1	0.0	0.0	**3.8**
Other service activities	4.2	14.3	0.0	11.1	**7.9**
Total	**9.9**	**10.3**	**9.4**	**8.9**	**9.9**

3.2.9 Enterprises with Mobile Money and Mobile Payments Accounts by Enterprise Size and Economic Activity

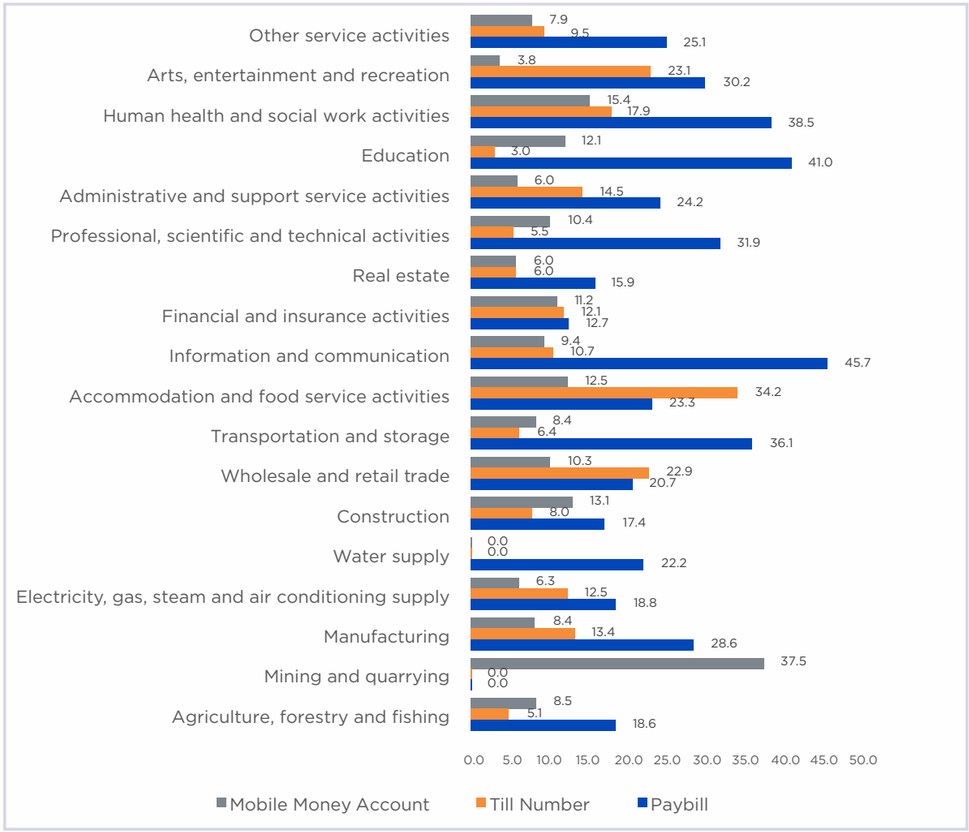
Figure 3.1 presents the proportion of enterprises with mobile money and mobile payment accounts by enterprise size. Overall, pay bill was the most common across all firm sizes followed by till/merchant accounts and mobile money accounts.

Figure 3. 1: Proportion of Enterprises with Mobile Money and Mobile Payment Accounts by Enterprise Size



Pay bill was observed to be more popular than other platforms across all sectors as shown in Figure 3.2. However, availability of mobile money account was high in mining and quarrying activities. Accommodation and food service activities had the highest proportion of enterprises with till/merchant numbers.

Figure 3. 2: Proportion of Enterprises with Mobile Money and Mobile Payment Accounts by Economic Activity



3.2.10 Use of Mobile Money and Mobile Payment Accounts to Receive Payments

Table 3.10 presents the proportion of payments received using mobile money and mobile payment accounts. Among the enterprises that used both mobile money and mobile payment accounts, the survey established that 79.3 per cent of their payments were received using the platform. Use of mobile money and mobile payment accounts to receive payments was highest in small and medium enterprises with 81.8 per cent and 80.8 per cent of the payments received through the platform, respectively.

The highest proportion of payments received using mobile money and mobile payment accounts were recorded in accommodation and food service activities at 90.1 per cent followed by arts, entertainment and recreation (85.9 per cent) and manufacturing (85.3 per cent). On the other hand, the lowest proportion of payments received through the mobile money and mobile payment accounts were reported in agriculture, forestry and fishing and financial insurance activities.

Table 3. 10: Proportion of Payments Received Using Mobile Money and Mobile Payment Accounts

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (Horticulture)	0.0	75.0	59.1	50.7	**56.6**
Mining and quarrying	100.0	100.0	50.0	0.0	**75.0**
Manufacturing	90.3	84.8	86.7	79.8	**85.3**
Electricity, gas, steam and air conditioning supply	50.0	100.0	50.0	0.0	**80.0**
Water supply; sewerage, waste management and remediation activities	60.0	50.0	0.0	100.0	**66.0**
Construction	73.7	68.5	81.8	50.0	**71.7**
Wholesale and retail trade	81.2	87.8	86.2	77.8	**84.3**
Transportation and storage	82.7	84.0	67.5	50.0	**77.7**
Accommodation and food service activities	81.3	91.3	88.2	100.0	**90.1**
Information and communication	78.0	72.0	76.2	75.0	**75.3**
Financial and insurance activities	53.1	59.5	48.0	77.8	**57.4**
Real estate	60.0	68.1	62.5	0.0	**64.0**
Professional, scientific and technical activities	66.2	62.1	55.6	50.0	**63.8**
Administrative and support service activities	75.7	74.5	88.2	80.0	**77.4**
Education	54.5	73.3	50.0	0.0	**64.9**
Human health and social work activities	55.6	77.8	83.3	75.0	**69.7**
Arts, entertainment and recreation	83.3	90.0	80.0	0.0	**85.9**
Other service activities	81.8	52.9	50.0	50.0	**67.1**
Total	**77.4**	**81.8**	**80.8**	**72.5**	**79.3**

3.2.11 Use of Mobile Money and Mobile Payment Accounts to Make Payments

Table 3.11 presents the proportion of payments that were made using mobile money and mobile payment accounts. There was high use of mobile money and mobile payment accounts with 73.7 per cent of payments being made through them. The use of the mobile money and mobile payment accounts was low in large enterprises with 61.8 per cent of the payments being made through it.

Enterprises in accommodation and food service activities posted the highest proportion of payments through mobile money and mobile payment accounts at 82.7 per cent. Electricity, gas, steam and air conditioning supply and financial insurance activities had the lowest proportion of payments made through the mobile money and mobile payment accounts at 45.8 per cent and 47.8 per cent, respectively.

Table 3. 11: Proportion of Payments Made Using Mobile Money and Mobile Payment Accounts

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	0.0	75.0	63.6	52.2	**58.5**
Mining and quarrying	100.0	100.0	50.0	0.0	**75.0**
Manufacturing	85.5	79.0	80.0	65.2	**78.0**
Electricity, gas, steam and air conditioning supply	50.0	50.0	25.0	0.0	**45.8**
Water supply; sewerage, waste management and remediation activities	60.0	50.0	0.0	0.0	**57.5**
Construction	63.2	66.3	81.8	66.7	**67.6**
Wholesale and retail trade	79.3	81.8	75.9	59.3	**79.4**
Transportation and storage	53.8	84.0	62.5	54.2	**70.2**
Accommodation and food service activities	68.8	83.3	86.3	87.5	**82.7**
Information and communication	74.0	64.0	71.4	50.0	**68.8**
Financial and insurance activities	46.9	51.4	44.0	44.4	**47.8**
Real estate	44.0	61.7	87.5	0.0	**58.1**
Professional, scientific and technical activities	58.3	64.4	61.1	33.3	**60.4**
Administrative and support service activities	75.7	72.3	76.5	66.7	**74.0**
Education	45.5	73.3	50.0	50.0	**62.3**
Human health and social work activities	61.1	55.6	100.0	75.0	**71.0**
Arts, entertainment and recreation	66.7	50.0	80.0	0.0	**64.4**
Other service activities	72.7	64.7	50.0	62.5	**66.3**
Total	**72.4**	**76.3**	**75.7**	**61.8**	**73.7**

3.2.12 Comparison in the Use of Mobile Money and Mobile Payment Accounts to Receive and Make Payments

A comparison in the use of mobile money and mobile payment accounts for receiving and making payments for business transactions by enterprise size is presented in Figure 3.3. In all categories of firms, the proportion of enterprises using the mobile money and mobile payment accounts to receive payments was higher than the proportion using them to make payments. The proportion of enterprises using mobile money and mobile payment accounts for their business transactions was lowest in large enterprises.

Figure 3. 3: Proportion of Enterprises Using Mobile Money and Mobile Payment Accounts to Receive and Make Payments by Enterprise Size

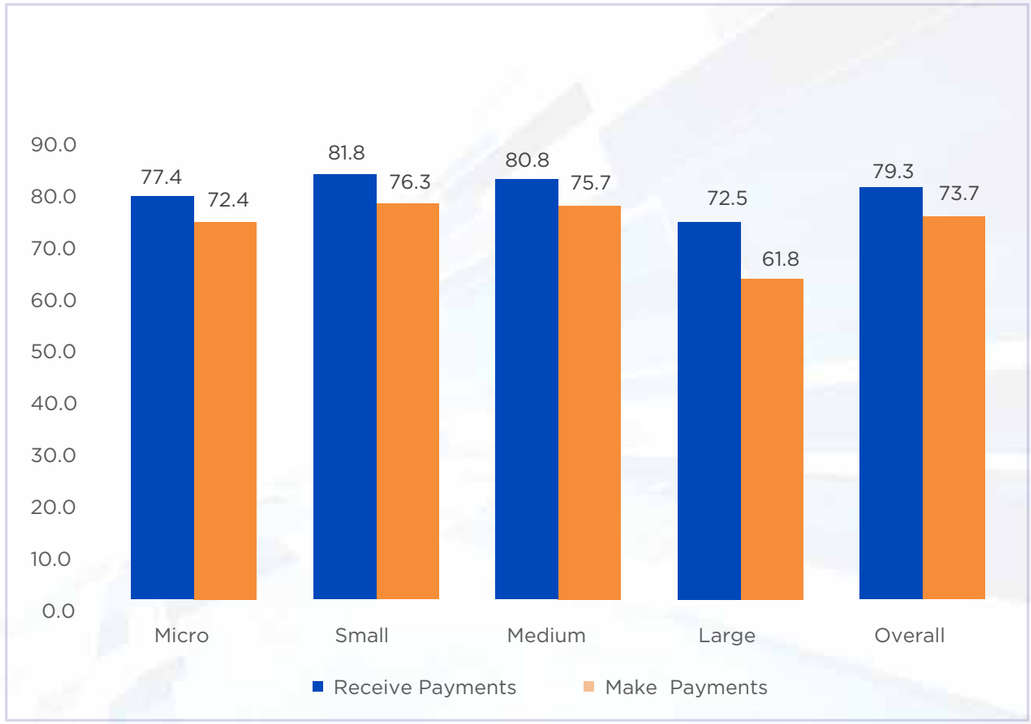
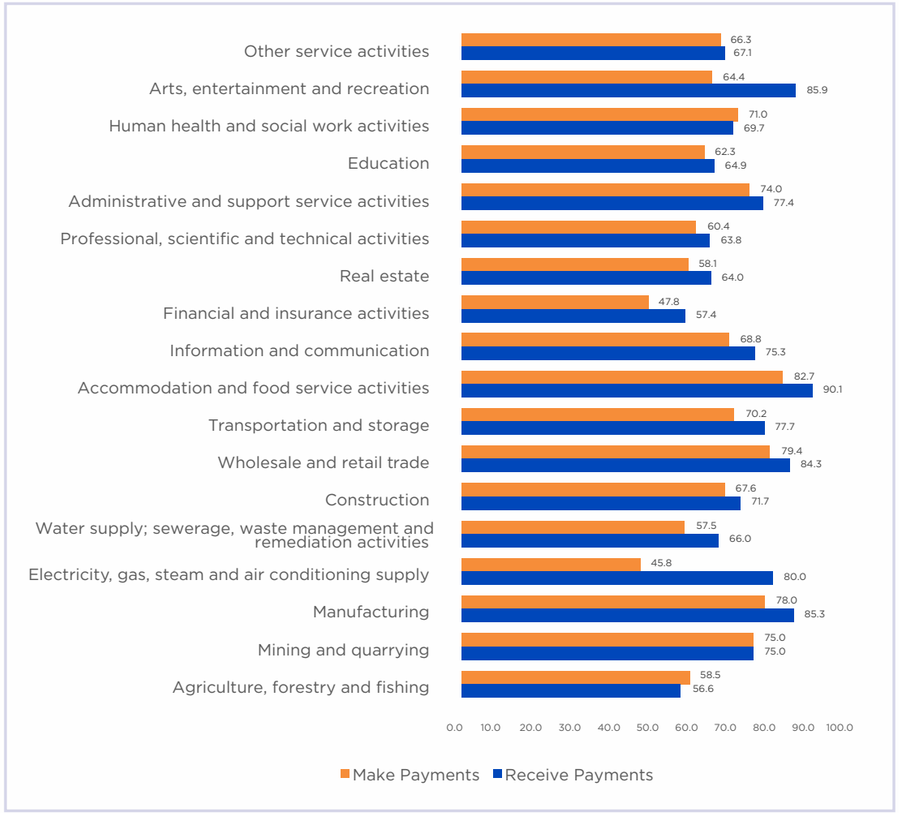


Figure 3.4 shows the comparison in the proportion of enterprises using mobile money and mobile payment accounts to receive and make payments by economic activity. Mobile money and mobile payment accounts were widely used in making and receiving payments in all sectors of the economy. In arts, entertainment, recreation, and electricity, gas, steam and air conditioning supply and accommodation and food service activities, the mobile money and mobile payment accounts were however used more for receiving than making payments.

Figure 3. 4: Proportion of Enterprises Using Mobile Money and Mobile Payment Accounts to Receive and Make Payments by Economic Activity



3.2.13 Use of Mobile Banking Platform

Use of mobile banking platform was generally low with only 29.2 per cent of the surveyed enterprises reporting its use in 2015. The platform was used by 35.1 per cent and 33.3 per cent of large and medium sized enterprises, respectively. Table 3.12 provides the proportion of enterprises that used mobile banking platform.

Analysis by economic activity indicates that mobile banking was used highly in financial and insurance activities with 43.1 per cent of the enterprises in this sector using it. Use of mobile banking was also significant in education, accommodation,and food service activities with 39.4 per cent and 35.4 per cent of the enterprises using it, respectively. However, Real estate, electricity, gas, steam and air conditioning supply; mining and quarrying and; agriculture, forestry and fishing activities had the lowest proportion of enterprises using mobile banking.

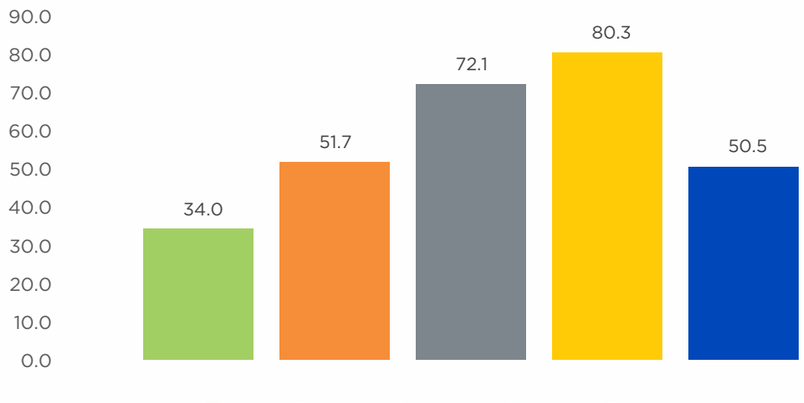
Table 3. 12: Proportion of Enterprises Using Mobile Banking Platform

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	20.0	40.0	3.7	28.2	**23.7**
Mining and quarrying	0.0	0.0	40.0	0.0	**25.0**
Manufacturing	23.0	30.8	33.8	28.0	**30.0**
Electricity, gas, steam and air conditioning supply	33.3	33.3	0.0	0.0	**25.0**
Water supply; sewerage, waste management and remediation activities	20.0	33.3	0.0	100.0	**33.3**
Construction	27.6	33.3	28.0	42.9	**31.0**
Wholesale and retail trade	25.5	26.8	34.7	31.3	**27.1**
Transportation and storage	20.3	23.8	35.0	29.2	**25.6**
Accommodation and food service activities	26.3	33.5	39.2	62.5	**35.4**
Information and communication	26.9	32.2	39.1	70.0	**33.3**
Financial and insurance activities	41.0	39.0	46.2	60.0	**43.1**
Real estate	13.2	22.2	66.7	0.0	**20.1**
Professional, scientific and technical activities	30.0	30.5	16.7	66.7	**30.1**
Administrative and support service activities	25.0	33.3	21.1	56.3	**30.1**
Education	33.3	33.3	50.0	100.0	**39.4**
Human health and social work activities	25.0	0.0	83.3	0.0	**25.6**
Arts, entertainment and recreation	22.2	54.5	0.0	0.0	**30.8**
Other service activities	20.8	28.6	33.3	22.2	**25.4**
Total	**25.6**	**29.8**	**33.3**	**35.1**	**29.2**

3.3 Use of Fixed Telephones

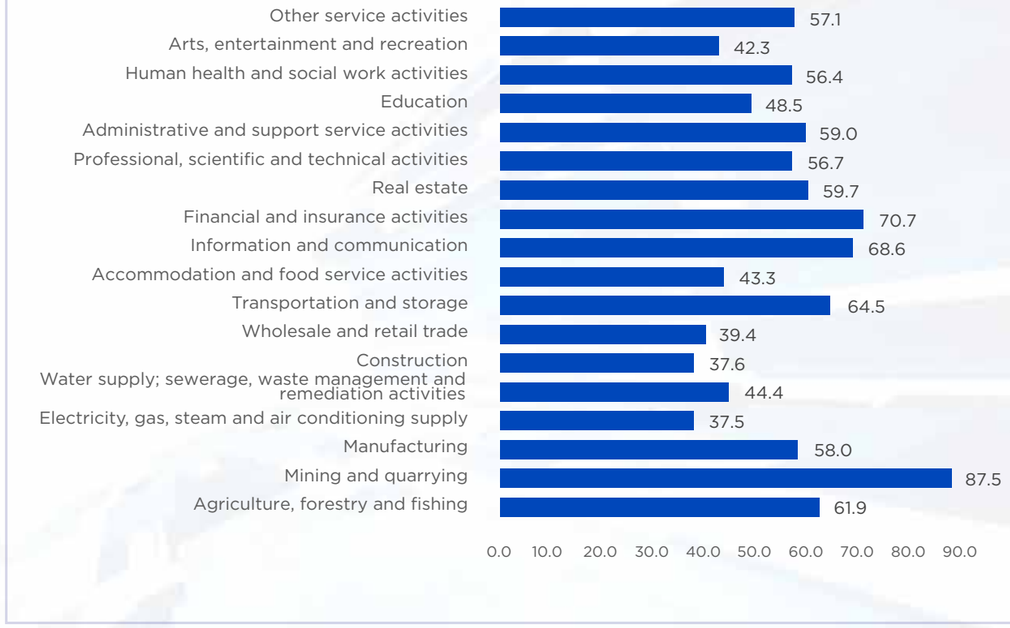
Overall, 50.5 per cent of all enterprises that participated in the survey had a fixed telephone as shown in Figure 3.5. The highest proportion of enterprises with fixed telephones were large firms at 80.3 per cent while those with the lowest proportion were micro enterprises at 34.0 per cent.

Figure 3. 5: Proportion of Enterprises with Fixed Telephones by Enterprise Size



The highest proportion of enterprises with fixed telephones were in mining and quarrying (87.5 per cent), financial and insurance activities (70.7 per cent) and information and communication (68.6 per cent) as shown in Figure 3.6. The lowest proportion of enterprises with fixed telephones were observed in electricity, gas, steam and air conditioning supply (37.5 per cent) and construction (37.6 per cent).

Figure 3. 6: Proportion of Enterprises with Fixed Telephones by Economic Activity



3.3.1 Receiving and Placing of Orders Using Fixed Telephone

Among enterprises that had a fixed telephone, 67.8 per cent and 54.1 per cent received and placed orders using fixed telephones, respectively. Use of fixed telephones to receive and place orders was more common in medium and small enterprises as shown in Figure 3.7.

Figure 3. 7: Proportion of Enterprise that Received and Placed Orders Using Fixed Telephones by Enterprise Size

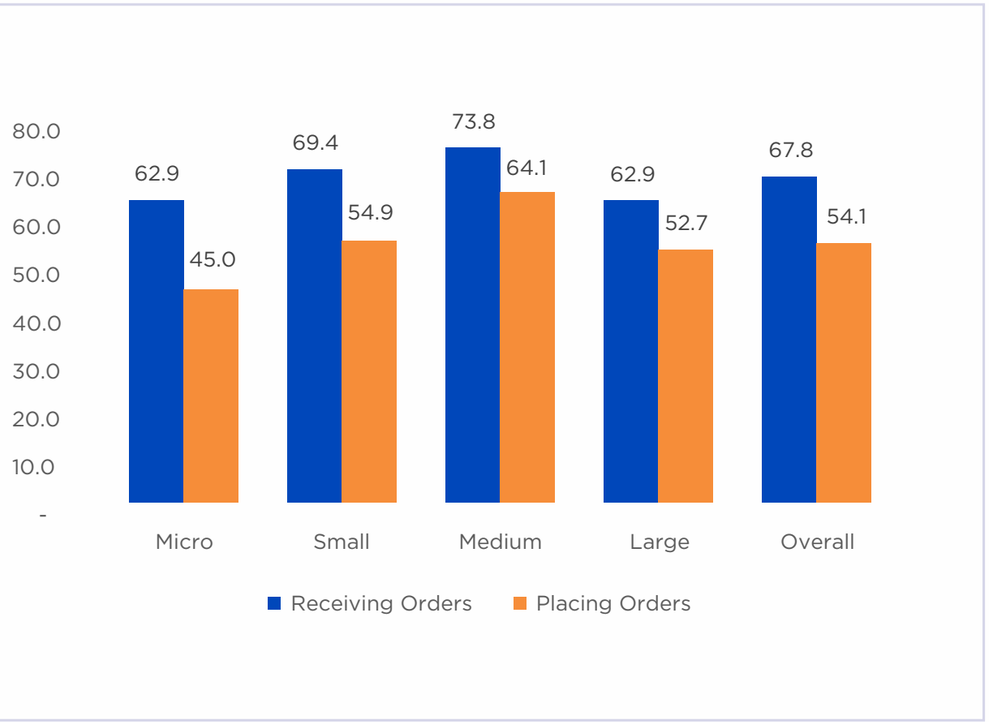
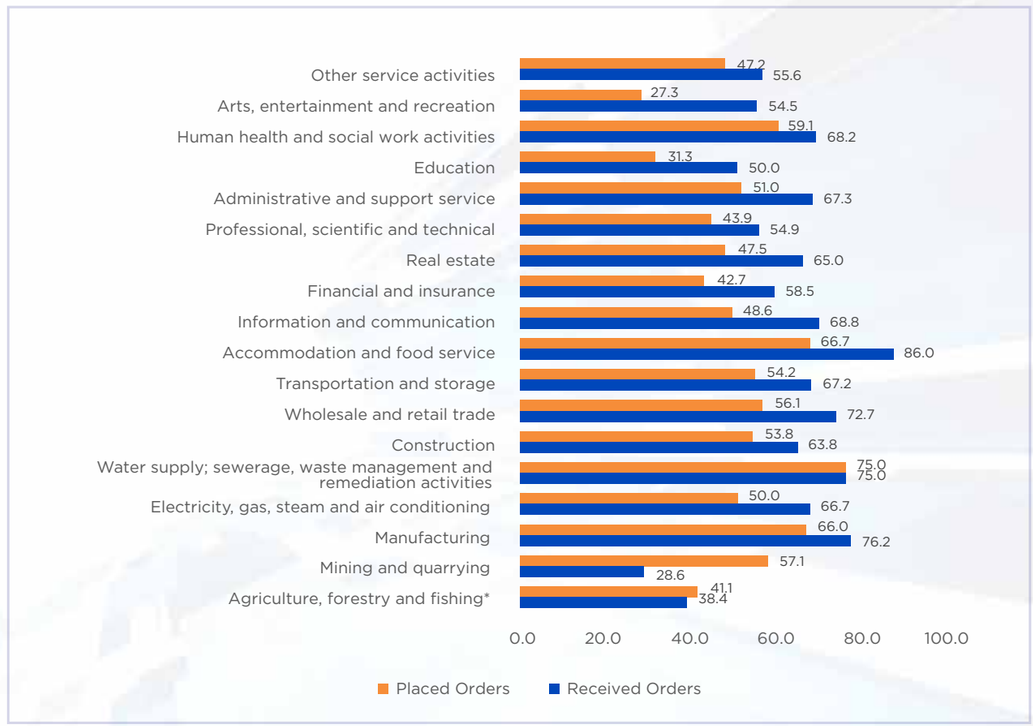


Figure 3.8 shows the proportion of orders received and placed using fixed telephones by economic activity. For enterprises that reported to have had a fixed telephone, accommodation and food service, manufacturing, water supply, sewerage management and remediation activities and Wholesale and retail trade activities had the highest proportion of orders received with fixed telephones at 86.0 per cent, 76.2 per cent and 75.0 per cent, respectively. On the other hand, arts, entertainment and recreation, mining and quarrying and education activities had the least proportion of orders received using fixed telephones.

Water supply, sewerage management, remediation, accommodation, and food service activities had the highest proportion of orders placed using fixed telephones at 75.0 per cent and 66.7 per cent, respectively.

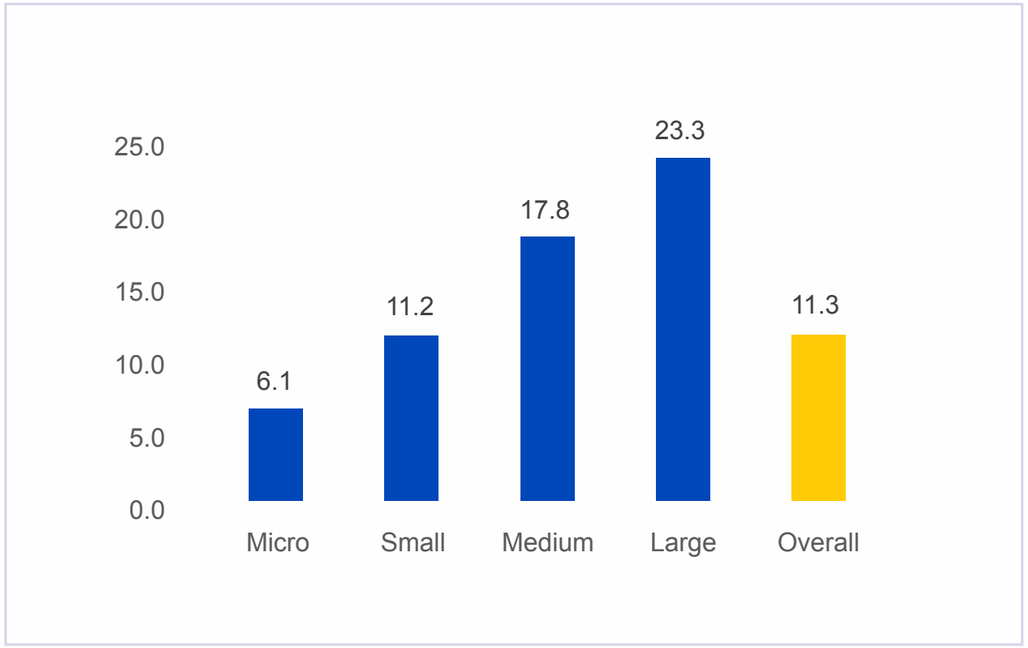
Figure 3. 8: Proportion of Enterprises Received and Placed Orders Using Fixed Telephones by Economic Activity



3.4 Use of Facsimiles

Overall, 11.3 per cent of the sampled enterprises had facsimiles in 2015 as presented in Figure 3.9. Use of facsimiles to place or receive orders was generally low across all enterprise sizes. Micro enterprises had the lowest proportion of firms using facsimiles at 6.1 per cent while large enterprises had the largest proportion at 23.3 per cent.

Figure 3. 9: Proportion of Enterprises with Facsimiles by Enterprise Size



Out of the enterprises that had facsimiles, 27.8 per cent and 22.6 per cent used it to receive and place orders, respectively as shown in Figure 3.10.

Figure 3. 10: Proportion of Enterprises Receiving and Placing Orders Using Facsimiles by Enterprise Size



3.5 Use of Computer and Other ICT Devices

The proportion of enterprises using computers is shown in Table 3.13. Overall, 92.0 per cent of the interviewed enterprises used computers. Almost all medium enterprises (99.1 per cent) and 98.1 per cent of large enterprises used computers in their work environment. Micro enterprises had the lowest proportion of those that used computers at 84.0 per cent.

There was high usage of computers across all sectors. All the surveyed enterprises engaged in mining and quarrying, electricity, gas, steam and air conditioning, education and human health and social work activities used computers. The lowest proportion of enterprises using computers were reported in Wholesale and retail trade, other service activities and water supply; sewerage, waste management and remediation activities at 83.9 per cent, 85.7 per cent and 88.9 per cent, respectively.

Table 3. 13: Proportion of Enterprises Using Computers

Economic Activity	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	80.0	100.0	92.6	100.0	**97.5**
Mining and quarrying	100.0	100.0	100.0	100.0	**100.0**
Manufacturing	86.5	98.1	100.0	98.9	**97.1**
Electricity, gas, steam and air conditioning supply	100.0	100.0	100.0	0.0	**100.0**
Water supply; sewerage, waste management and remediation activities	80.0	100.0	0.0	100.0	**88.9**
Construction	89.5	91.4	96.0	100.0	**91.5**
Wholesale and retail trade	71.7	96.2	99.2	96.9	**83.9**
Transportation and storage	94.9	100.0	100.0	95.8	**98.0**
Accommodation and food service activities	78.9	88.6	100.0	100.0	**90.1**
Information and communication	100.0	98.3	100.0	100.0	**99.4**
Financial and insurance activities	92.3	100.0	100.0	100.0	**97.4**
Real estate	92.6	100.0	100.0	66.7	**95.5**
Professional, scientific and technical activities	99.4	97.9	100.0	100.0	**99.0**
Administrative and support service activities	100.0	98.0	100.0	93.8	**98.8**
Education	100.0	100.0	100.0	100.0	**100.0**
Human health and social work activities	100.0	100.0	100.0	100.0	**100.0**
Arts, entertainment and recreation	77.8	100.0	100.0	0.0	**92.3**
Other service activities	83.3	85.7	88.9	88.9	**85.7**
Total	**84.0**	**95.9**	**99.1**	**98.0**	**92.0**

The median number of employees provided with ICT equipment and accessories by sex and size of enterprise is presented in Table 3.14. More males than females were observed to have been provided with ICT equipment and accessories for most of the items under consideration.

Overall, large firms provided the largest number while micro enterprises provided the smallest number of ICT equipment and accessories to their employees as presented in Table 3.14. On average, the surveyed enterprises provided tablets/phablets to two and one male and female employees, respectively. Enterprises provided an average of three male and two female employees with desktop computers with large enterprises providing the equipment to eighteen and ten male and female employees, respectively. There was no variation by sex in the number of employees being provided with laptops with an average of two male and female employees being given a laptop for official use. Mobile phones and sim cards were provided in the same ratio at 3 and 2 males and females, respectively. Large firms however provided an average of fourteen and six male and female employees with airtime, respectively.

Table 3. 14: Median Number of Employees Provided with ICT Equipment and Accessories by Sex

Type of Computer Equipment and Accessories	Sex	Enterprise Size				
		Micro	Small	Medium	Large	Overall
Tablets/Phablets	Male	1	1	3	3	**2**
	Female	1	1	2	2	**1**
Desktop Computers	Male	2	3	8	18	**3**
	Female	1	2	6	10	**2**
Laptops	Male	1	2	4	5	**2**
	Female	1	2	3	5	**2**
Mobile Phones	Male	2	3	5	10	**3**
	Female	1	2	3	5	**2**
Modems	Male	1	2	2	3	**1**
	Female	1	1	1	2	**1**
Flash Disks	Male	1	2	3	4	**2**
	Female	1	1	2	3	**1**
Sim Cards	Male	2	3	5	10	**3**
	Female	1	2	3	5	**2**
Airtime	Male	2	4	7	14	**3**
	Female	1	2	4	6	**2**

Chapter 4

Internet Infrastructure and Use of Applications

Chapter 4. Internet Infrastructure and Use of Applications

4.1 Introduction

Internet is defined as the global information that is linked together by a global unique address space based on the Internet Protocol (IP) or the Transmission Control Protocol (TCP) suite or its subsequent extensions supporting communications. Internet also provides and makes information accessible, either publicly or privately using high level services layered on the communications and related infrastructure. Internet has become critical infrastructure for society and global commerce. This has eased transactions and reduced the cost of doing business. For this to be realised there is need for appropriate infrastructure to enable social and economic growth. It is therefore important to measure the availability, access and use of Internet for policy making and for use by researchers. The survey sought to establish access to Internet by type and its use by enterprises.

4.2 Internet Infrastructure

The survey established that 84.2 per cent of the surveyed enterprises had Internet in their premises as seen in Figure 4.1. More than two thirds of the firms had Internet in their premises. However, micro enterprises had the lowest proportion of those with Internet in their premises at 70.9 per cent. This shows that there is a robust demand of Internet by enterprises especially in their premises.

Figure 4. 1: Proportion of Enterprises with Internet in their Premises, by Firm Size

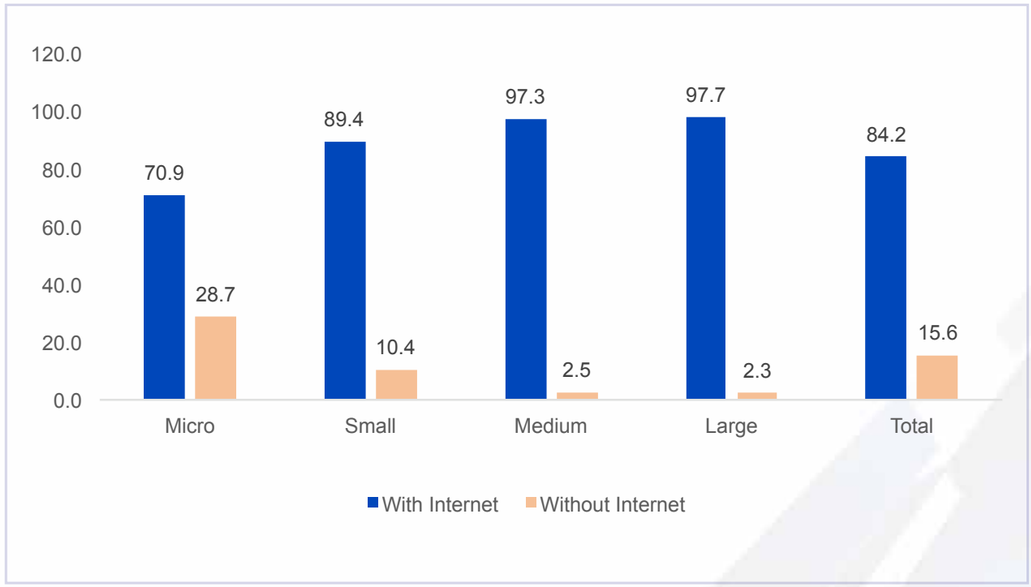


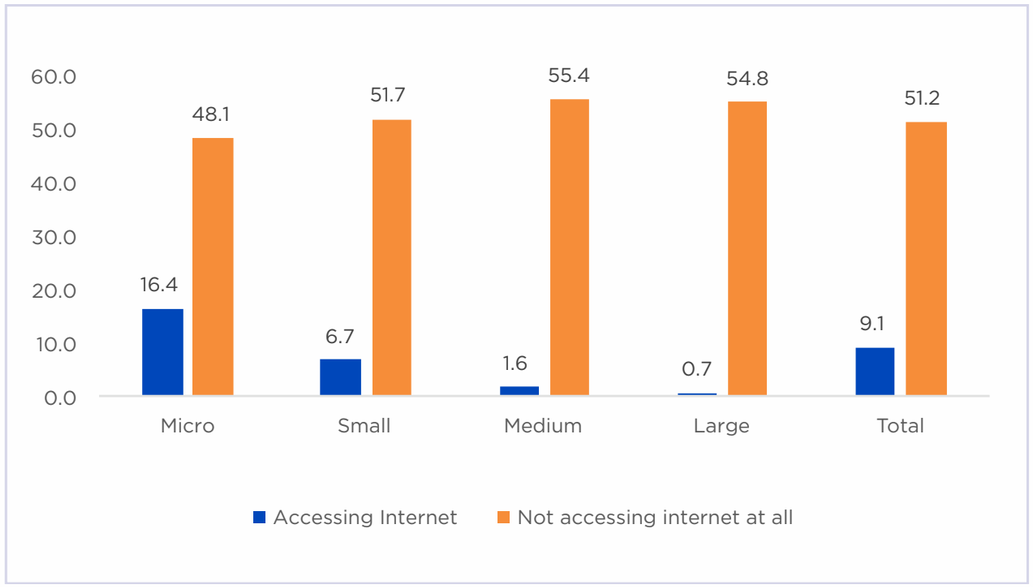
Table 4.1 presents information on Internet availability by economic activity. All enterprises in mining and quarrying sector had Internet in their premises. Wholesale and retail trade and construction had the least proportion of enterprises with Internet in their premises at 71.4 per cent and 77.9 per cent, respectively.

Table 4. 1: Proportion of Enterprises with Internet in their Premises, by Economic Activity

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	60.0	86.7	85.2	100.0	**93.2**
Mining and quarrying	100.0	100.0	100.0	100.0	**100.0**
Manufacturing	67.6	94.3	99.4	100.0	**93.0**
Electricity, gas, steam and air conditioning supply	83.3	100.0	100.0	0.0	**93.8**
Water supply; sewerage, waste management and remediation activities	80.0	100.0	0.0	100.0	**88.9**
Construction	72.4	79.0	88.0	85.7	**77.9**
Wholesale and retail trade	55.1	85.7	96.0	100.0	**71.4**
Transportation and storage	89.8	97.5	97.5	95.8	**95.1**
Accommodation and food service activities	60.5	80.4	98.0	100.0	**82.1**
Information and communication	98.5	100.0	100.0	100.0	**99.4**
Financial and insurance activities	84.6	97.6	100.0	80.0	**92.2**
Real estate	79.4	98.1	100.0	66.7	**88.1**
Professional, scientific and technical activities	94.1	97.9	100.0	100.0	**95.8**
Administrative and support service activities	92.5	94.1	100.0	93.8	**94.0**
Education	83.3	93.3	100.0	100.0	**90.9**
Human health and social work activities	85.0	100.0	100.0	100.0	**92.3**
Arts, entertainment and recreation	55.6	100.0	100.0	0.0	**84.6**
Other service activities	75.0	81.0	100.0	88.9	**82.5**
Total	**70.9**	**89.4**	**97.3**	**97.7**	**84.2**

Out of the firms that did not have Internet in their premises, 9.1 per cent accessed Internet elsewhere while 51.2 per cent did not access Internet at all as shown in Figure 4.2. The largest proportion of firms accessing Internet outside their premises were micro sized followed by small enterprises at 16.4 per cent and 6.7 per cent, respectively.

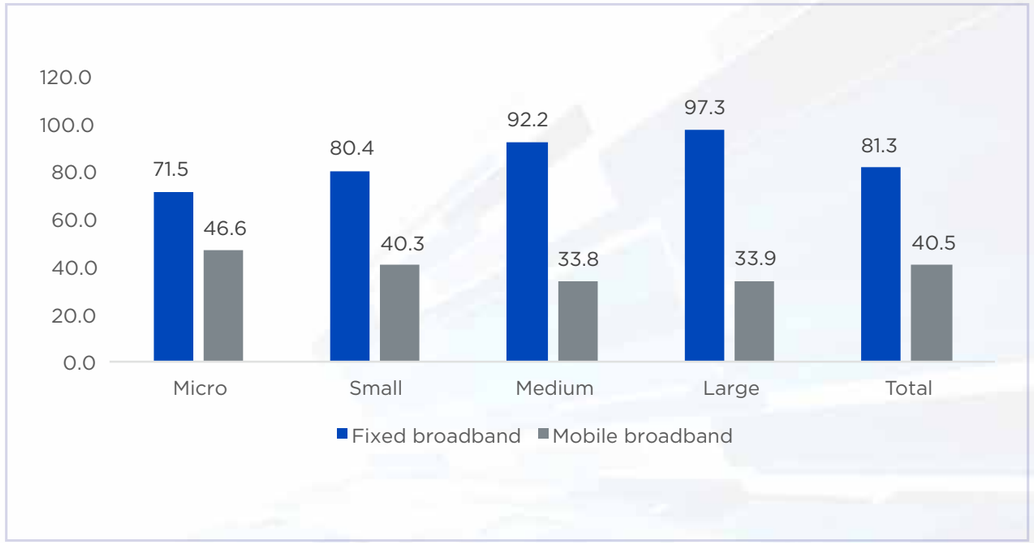
Figure 4. 2: Proportion of Enterprises Accessing Internet Outside their Premises, by Firm Size



4.2.1 Fixed and Mobile Broadband

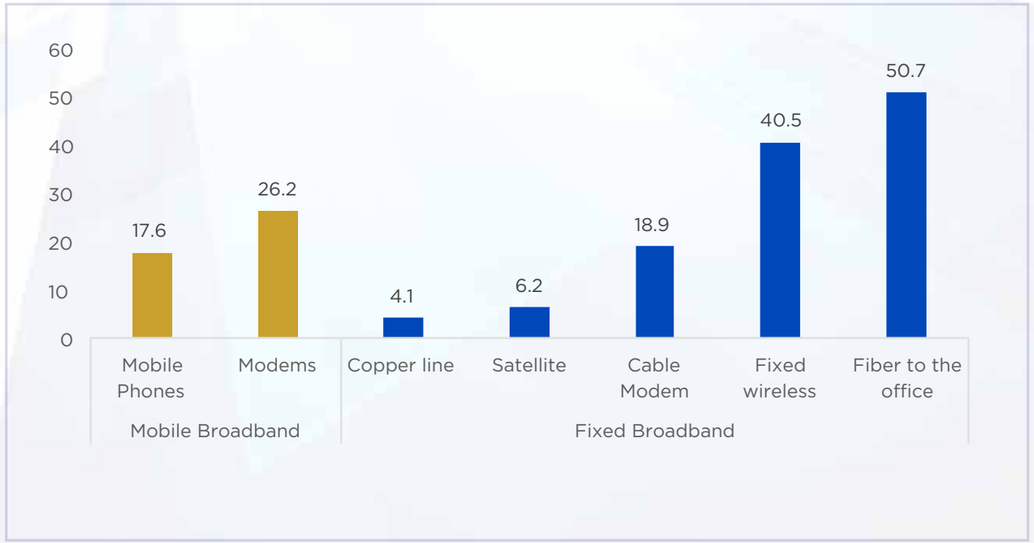
Broadband network has increased over the years and the availability of fiber optic has enabled most businesses to consider using Internet in their commercial activities. The type of Internet technology, its availability and affordability determines its uptake. The survey's findings indicate that most businesses preferred to use fixed broadband to access Internet in their business premises. Fixed broadband, which includes cable modem, copper line, fiber to the office, satellite and fixed wireless, was the most preferred with 81.3 per cent of businesses using it. Mobile broadband, which include mobile phones and modems, was used for accessing Internet by 40.5 per cent of the enterprises as seen in Figure 4.3. Large and medium sized enterprises had the highest proportion of firms using fixed broadband at 97.3 per cent and 92.2 per cent, respectively. On the other hand, micro enterprises had the largest proportion of those that used mobile broadband at 71.5 per cent.

Figure 4. 3: Proportion of Enterprises with Internet, by Type of Broadband



Slightly more than half of the surveyed firms used fiber optic with only 4.1 per cent using copper dial up fixed broadband as seen is Figure 4.4. On the other hand, modems were used by 26.2 per cent of the firms while 17.6 per cent accessed Internet for official purposes, through mobile phones.

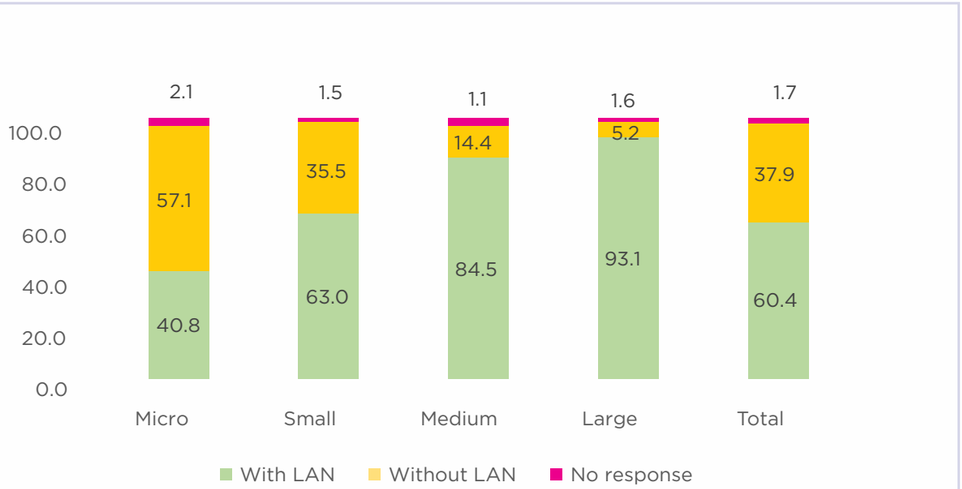
Figure 4. 4: Proportion of Enterprises using Fixed and Mobile Broadband, by Type



4.2.2 Local Area Network

Increased demand and use of computers in businesses has generated the need to connect computers for ease of sharing information. This is done by the use of Local Area Network (LAN), which connects two or more computers in a building or a room. The survey findings show that 60.4 per cent of surveyed businesses used LAN. The highest proportion of enterprises using LAN were large businesses (93.1 per cent) followed by medium sized enterprises at 84.5 per cent. Only 40.8 per cent of micro enterprises used the technology as seen on Figure 4.5.

Figure 4. 5: Proportion of Enterprises with LAN, by Firm Size

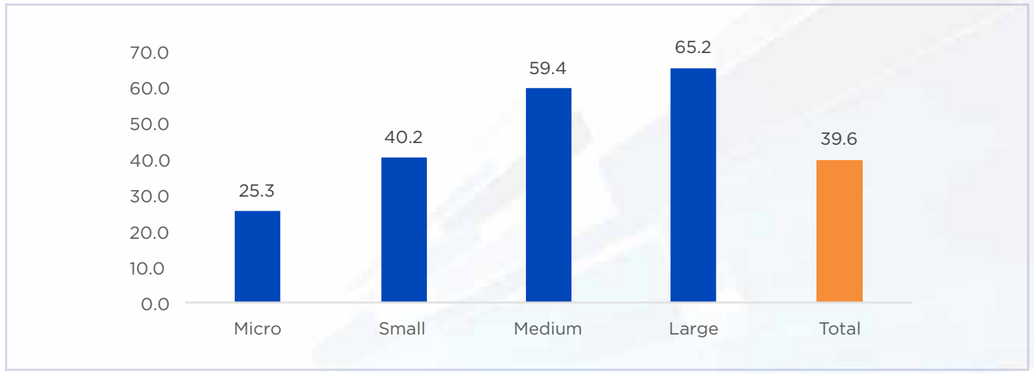


4.2.3 Enterprises with Intranet and Extranet

4.2.3.1 Intranet

An intranet comprises a restricted computer network, controlled by and usually reserved for a single enterprise. An enterprise usually has its own physical infrastructure for intranet that is separate from the Internet. Some intranet infrastructure offer Internet access and some do not due to privacy and security issues or lack of need. According to the survey's findings, 39.6 per cent of the sampled enterprises reported to be using intranet. About two thirds of the large enterprises (65.2 per cent) used intranet while only 25.3 per cent of micro enterprises deployed intranet as shown in Figure 4.6.

Figure 4. 6: Proportion of Enterprises with Intranet



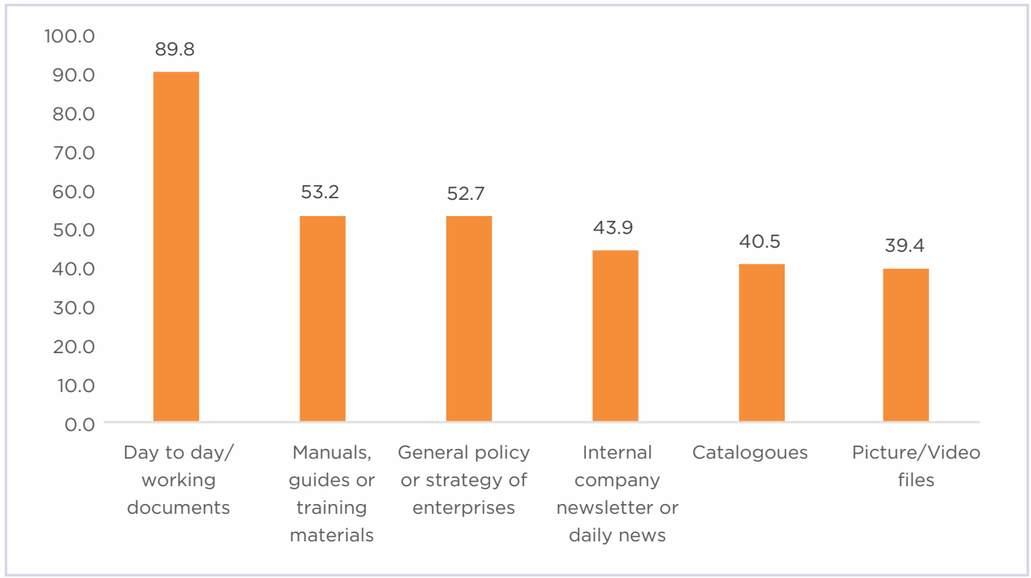
Analysis of the proportion of enterprises with intranet by economic activity revealed that, electricity; gas, steam and air conditioning supply; and mining and quarrying had the highest uptake of intranet at 62.5 per cent as seen in Table 4.2. Other service activities and Wholesale and retail trade were the least users of intranet at 28.6 per cent and 27.5 per cent, respectively.

Table 4. 2: Proportion of Enterprises with Intranet

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	40.0	46.7	51.9	52.1	50.8
Mining and quarrying	0.0	100.0	60.0	100.0	62.5
Manufacturing	27.0	35.2	55.0	63.4	45.9
Electricity, gas, steam and air conditioning supply	33.3	83.3	75.0	0.0	62.5
Water supply; sewerage, waste management and remediation activities	0.0	66.7	0.0	100.0	33.3
Construction	27.6	27.6	52.0	57.1	31.5
Wholesale and retail trade	15.2	35.6	49.2	71.9	27.5
Transportation and storage	40.7	63.8	75.0	75.0	60.6
Accommodation and food service activities	21.1	35.4	62.7	87.5	41.8
Information and communication	38.8	54.2	82.6	90.0	54.1
Financial and insurance activities	38.5	48.8	88.5	100.0	58.6
Real estate	27.9	44.4	66.7	33.3	37.3
Professional, scientific and technical activities	35.3	51.6	72.2	66.7	43.6
Administrative and support service activities	45.0	43.1	52.6	62.5	47.0
Education	25.0	33.3	100.0	50.0	39.4
Human health and social work activities	40.0	44.4	50.0	100.0	48.7
Arts, entertainment and recreation	33.3	45.5	83.3	0.0	50.0
Other service activities	25.0	28.6	33.3	33.3	28.6
Total	25.3	40.2	59.4	65.2	39.6

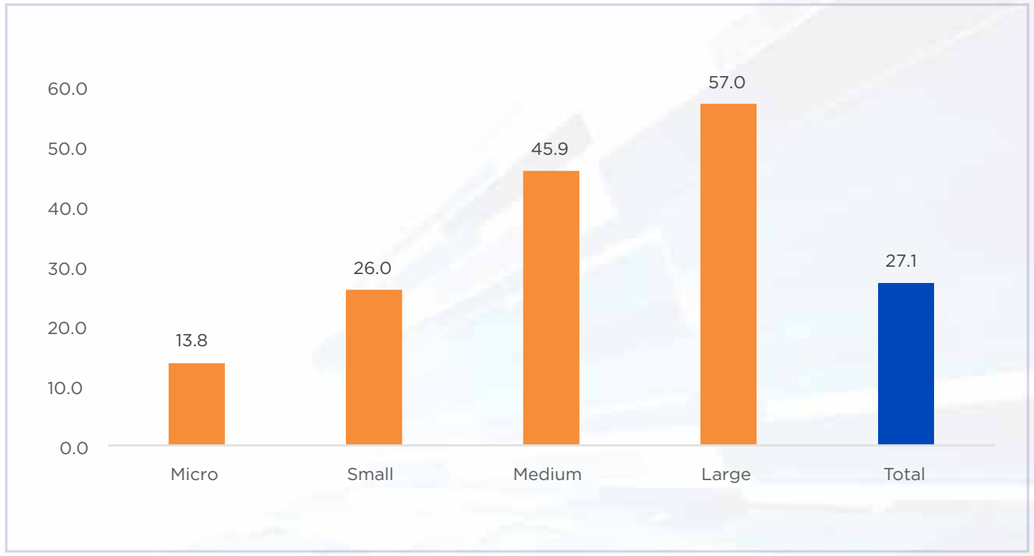
Out of the enterprises that reported to use intranet, 89.8 per cent were found to use intranet to share documents on day-to-day basis while 39.4 per cent of the enterprises used intranet to share pictures and video files as shown in Figure 4.7.

Figure 4. 7: Proportion of Enterprises using Intranet by Type of Information Shared



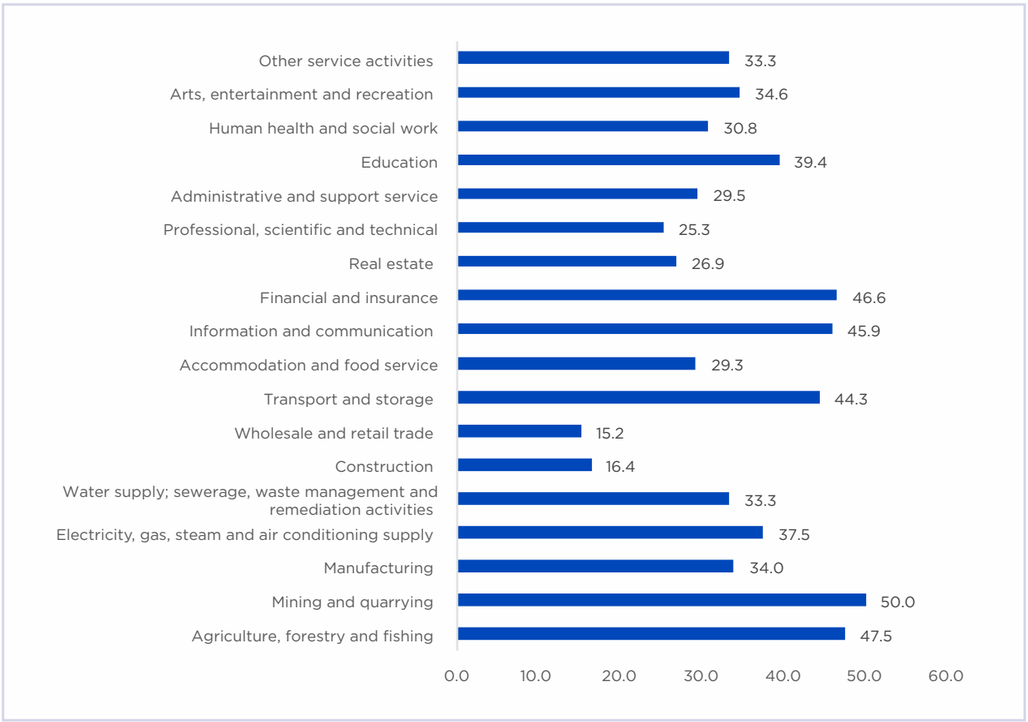
Among enterprises with intranet, 27.1 per cent used specialised applications for human resource services rendered through the platform as seen in Figure 4.8. Large enterprises followed by medium enterprises had the highest proportion of enterprises that used intranet to access specialised applications at 57.0 per cent and 45.9 per cent, respectively.

Figure 4. 8: Proportion of Enterprises using Specialised Applications for Human Resource



Analysis of use of intranet by economic activity revealed that, mining and quarrying (50.0 per cent) followed by horticultural firms (47.5 per cent) had the largest proportion of enterprises using intranet to access specialised applications for human resource as seen in Figure 4.9.

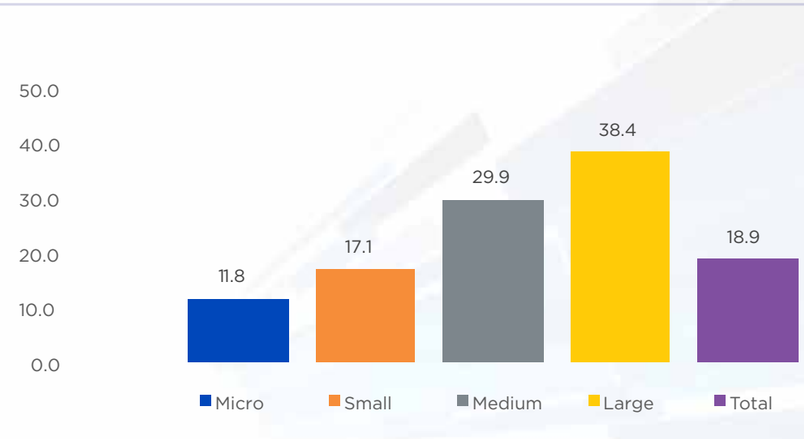
Figure 4. 9: Proportion of Enterprises using Specialised Applications for Human Resource, by Economic Activity



4.2.3.2 Enterprises with Extranet

Extranet run through virtual private network allowing connection with businesses outside the premises such as suppliers, vendors and customers. Extranets can connect multiple intranets to facilitate cooperation between different enterprises on joint projects, initiatives and information sharing. They also allow multiple firms to access network services provided by another firm such as data processing. According to the survey, 18.9 per cent of enterprises had extranet. The use of extranet was found to be highest in large (38.4 per cent) and medium sized firms (29.9 per cent) as shown in Figure 4.10.

Figure 4. 10: Proportion of Enterprises with Extranet, by Firm Size



As shown in Table 4.3, the highest proportion of enterprises that used extranet were in financial and insurance activities and information and communication at 42.2 per cent and 37.7 per cent, respectively.

Table 4. 3: Proportion of Enterprises with Extranet

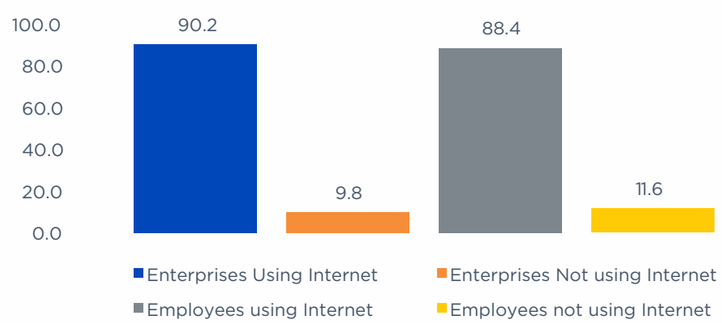
Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	20.0	20.0	14.8	32.4	**26.3**
Mining and quarrying	0.0	0.0	20.0	0.0	**12.5**
Manufacturing	6.8	13.8	25.0	30.1	**19.5**
Electricity, gas, steam and air conditioning supply	0.0	33.3	25.0		**18.8**
Water supply; sewerage, waste management and remediation activities	0.0	0.0		100.0	**11.1**
Construction	10.5	8.6	24.0	14.3	**11.3**
Wholesale and retail trade	5.6	13.1	25.0	34.4	**11.0**
Transportation and storage	23.7	25.0	37.5	37.5	**28.6**
Accommodation and food service activities	13.2	15.8	35.3	62.5	**22.1**
Information and communication	32.8	28.8	60.9	70.0	**37.7**
Financial and insurance activities	15.4	43.9	57.7	100.0	**42.2**
Real estate	11.8	18.5	44.4	0.0	**16.4**
Professional, scientific and technical activities	16.5	22.1	33.3	50.0	**20.1**
Administrative and support service activities	26.3	25.5	21.1	43.8	**27.1**
Education	25.0	13.3	50.0	100.0	**27.3**
Human health and social work activities	15.0	33.3	50.0	50.0	**28.2**
Arts, entertainment and recreation	11.1	9.1	16.7		**11.5**
Other service activities	8.3	9.5	11.1	33.3	**12.7**
Total	11.8	17.1	29.9	38.4	**18.9**

4.3 Use of Internet and Computer Systems

4.3.1 Use of Internet

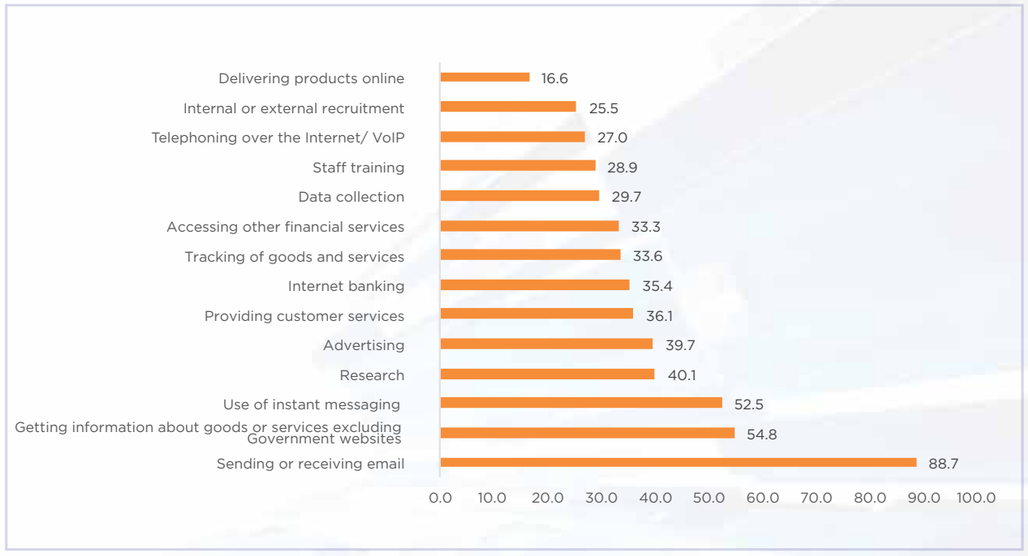
The survey sought to establish Internet use by type of activity including online government services. The survey findings show that 90.2 per cent of the enterprises used Internet while 88.4 per cent of the employees used it for official purposes as seen in Figure 4.11.

Figure 4. 11: Proportion of Enterprises and Employees Using Internet for Official Purpose



Activities carried over Internet is part of core indicators used by countries to compare Internet usage in enterprises. According to the survey findings, majority of businesses used Internet for sending and receiving emails (88.7 per cent) and getting information about goods and services (54.8 per cent). The least activity carried out over the Internet was delivery of products (such as books, software and movies) online (16.6 per cent) as seen in Figure 4.12.

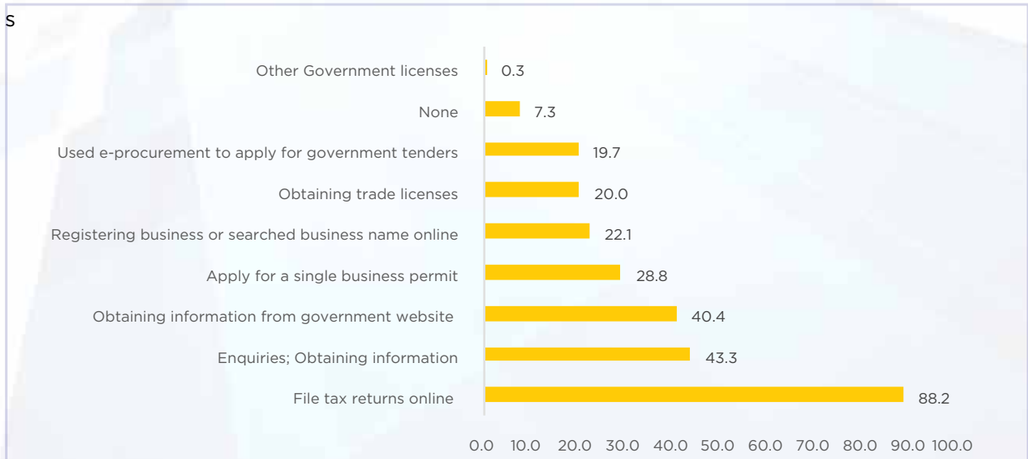
Figure 4. 12: Proportion of Enterprises Using the Internet by Type of Activity



According to the survey findings, 92.7 per cent of enterprises used e-government services as shown in Figure 4.13. Most enterprises filed their taxes online (88.2 per cent) while only 0.3 per cent used e-government services to obtain other government licenses.

Figure 4. 13: Proportion of Enterprises Using E-government Services

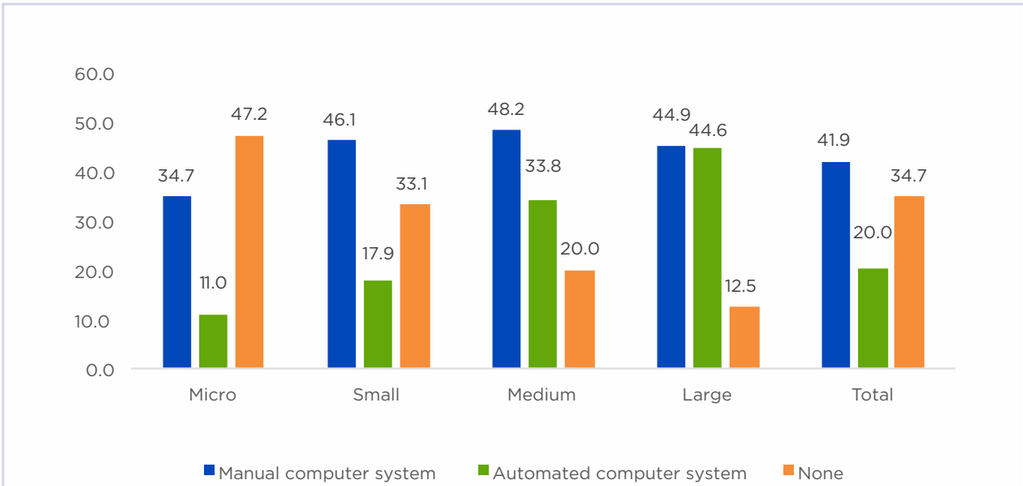
s



4.3.2 Use of Computer Systems to Place or Receive Orders

Manual computer systems were used by 41.9 per cent of enterprises in placing and receiving orders as shown in Figure 4.14. One fifth of the enterprises used automated computer systems while 34.7 per cent never used systems for placing or receiving orders. Micro enterprises had the highest proportion of enterprises that did not use any computer system in placing and receiving orders at 47.2 per cent while large enterprises had the highest proportion of those using automated systems for placing and receiving orders at 44.6 per cent.

Figure 4. 14: Proportion of Enterprises Using Computer Systems to Place and Receive Orders

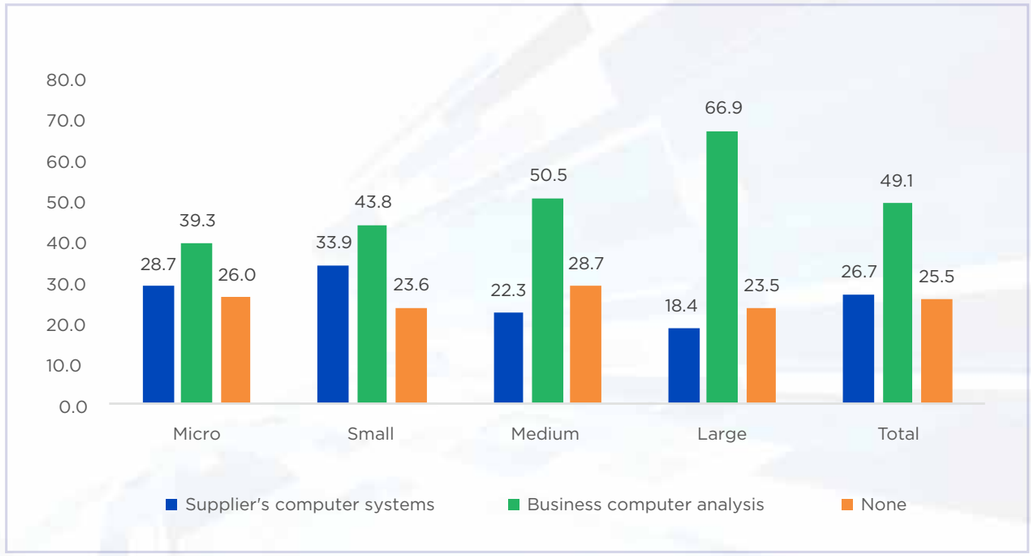


4.3.3 Automatically Linked Computer Systems Used for Placing Orders:

Enterprises can connect automatically to computer systems of their supplier and business partners. Computer systems connected to suppliers automatically alert the firm on when to replenish orders and request for new stock. Business computer analysis is used for ordering or inventory control, accounting production or service operations within the enterprise.

The survey findings show that 26.7 per cent of the enterprises who had automated computer systems were connected to the supplier's computer systems while 49.1 per cent were connected to business computer analysis as seen in Figure 4.15. Across all firms, most enterprises used automated computer system for their own business analysis to place orders.

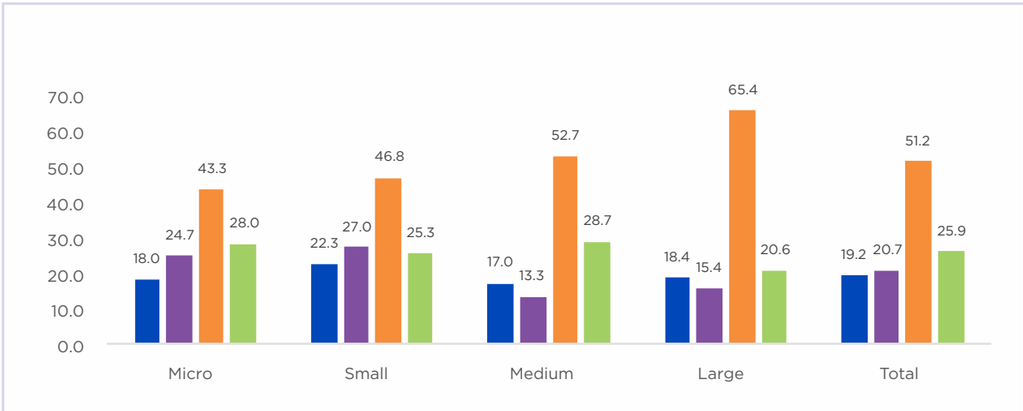
Figure 4. 15: Proportion of Enterprises with Automatically Linked Systems for Placing Orders



4.3.4 Automatically Linked Computer Systems Used for Receiving Orders

Slightly over half (51.2 per cent) of the enterprises with automatic computer systems used the business systems while only 20.7 per cent used supplier's computer systems in receiving orders as seen in Figure 4.16. However, 25.9 per cent of enterprises did not receive orders using any form of automatically linked computer systems. Most orders received through the automatic systems were done using own business systems across all firm size categories.

Figure 4. 16: Proportion of Enterprises with Automatically Linked Systems for Receiving Orders



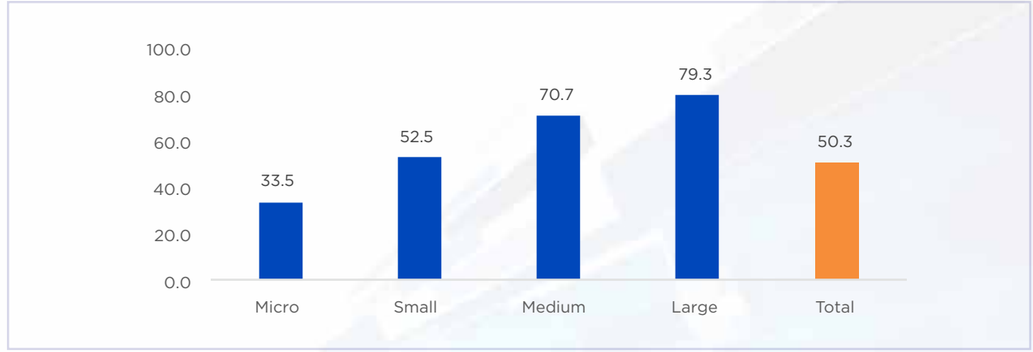
4.4 Use of Internet Applications

The advent of the digital age means that customers often access vital services or review products online before purchasing. Similarly, enterprises often seek to have an online presence to be more accessible, reach and attract more customers, build a brand, encourage customer reviews and feedback and for marketing purposes. This section presents findings on the level of online presence of enterprises and assesses use of website, email and social media.

4.4.1 Enterprises with Web Presence

The presence of the web in enterprises is often signified by a home page address and is one of the key ICT indicators. Overall, 50.3 per cent of enterprises reported to have a website. Of these, majority were large and medium sized enterprises, at 79.3 per cent and 70.7 per cent, respectively, as shown in Figure 4.17

Figure 4. 17: Proportion of Enterprises with Web Presence, by Enterprise Size



The proportion of enterprises with a website by economic activity is presented in Table 4.4. The survey established that, information and communication had the largest proportion of firms with a website at 83.0 per cent while construction had the lowest proportion of firms with a website at 30.5 per cent.

Table 4. 4: Proportion of Enterprises with Web Presence, by Size and Economic Activity

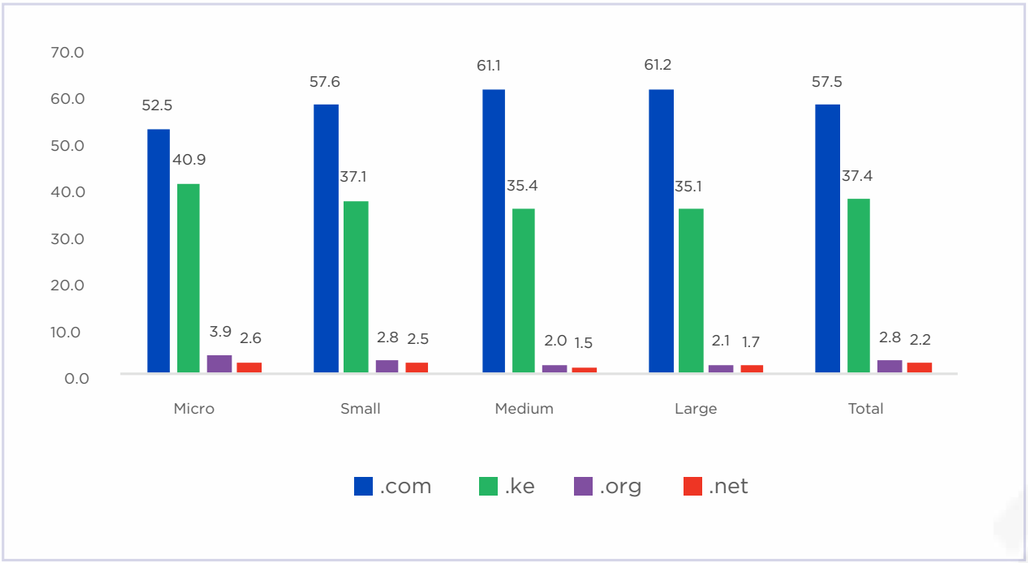
Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	40.0	53.3	55.6	77.5	**67.8**
Mining and quarrying	0.0	100.0	60.0	100.0	**62.5**
Manufacturing	32.4	45.3	63.8	74.2	**54.9**
Electricity, gas, steam and air conditioning supply	33.3	66.7	100.0	0.0	**62.5**
Water supply; sewerage, waste management and remediation activities	60.0	66.7	0.0	100.0	**66.7**
Construction	19.7	27.6	64.0	71.4	**30.5**
Wholesale and retail trade	18.0	41.1	49.2	81.3	**31.1**
Transportation and storage	44.1	60.0	82.5	79.2	**62.1**
Accommodation and food service activities	44.7	52.5	96.1	87.5	**62.0**
Information and communication	65.7	93.2	100.0	100.0	**83.0**
Financial and insurance activities	56.4	70.7	96.2	100.0	**74.1**
Real estate	32.4	61.1	77.8	33.3	**47.0**
Professional, scientific and technical activities	55.3	77.9	94.4	100.0	**66.1**
Administrative and support service activities	56.3	82.4	78.9	75.0	**68.7**
Education	66.7	66.7	100.0	100.0	**72.7**
Human health and social work activities	45.0	33.3	100.0	100.0	**56.4**
Arts, entertainment and recreation	33.3	63.6	66.7	0.0	**53.8**
Other service activities	45.8	52.4	100.0	77.8	**60.3**
Total	**33.5**	**52.5**	**70.7**	**79.3**	**50.3**

4.4.2 Domain Names

There are numerous choices for domain names available to enterprises. However, the choices are often informed by ease of access to the domain, industry of operation, the nature of the enterprise and the cost of the domain. The results of the survey indicate that the uptake of international domain such as “dot com” is higher compared to the Kenyan domain, “dot ke”. The “dot com” domain name was used by 57.5 per cent of enterprises while “dot ke” was used by 37.4 per cent of firms with a website as seen in Figure 4.18. Other International domains used stood at 2.8 per cent and 2.2 per cent for “dot org” and “dot net”, respectively.

Analysis of the uptake of domains by firm size show that large firms (61.2 per cent) followed by medium sized firms (61.1 per cent) had the largest proportion of those using the “dot com” domain. Micro enterprises on the other hand, were the largest users of the “dot ke” domain at 40.9 per cent followed by small enterprises at 37.1 per cent.

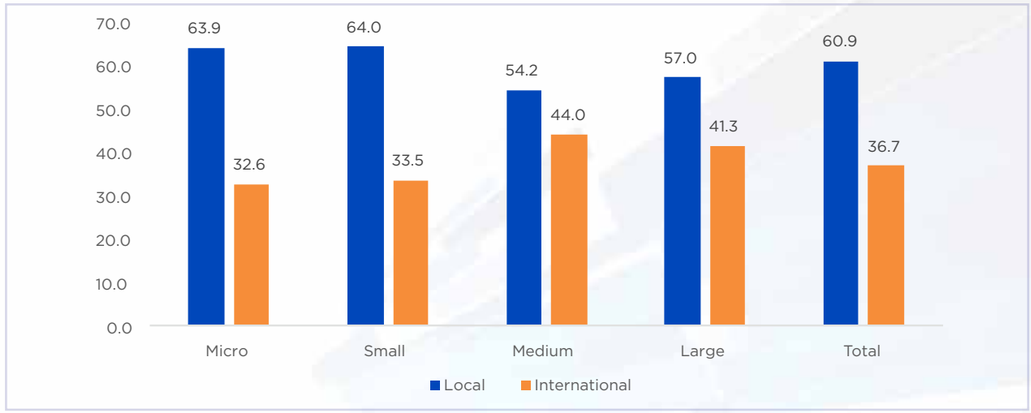
Figure 4. 18: Proportion of Enterprises with Web Presence by Type of Domain Names



4.4.3 Website Hosting

Web hosting is a service that enables a website to be accessible via the Internet. The service is supported through a server that ensures the hosting of data is visible on a website including; images, content, and administration codes/rights. The choice of location for hosting a firm’s website is usually informed by several factors. These include affordability, reliability of the service, security of information and enterprise policies. The local host was the most commonly used as reported by 60.9 per cent of the enterprises while 36.7 per cent hosted their website internationally. Majority of micro and small firms hosted their website locally while large and medium sized firms had a large proportion of those hosting their website internationally as shown in Figure 4.19.

Figure 4. 19: Proportion of Enterprises Hosting Website Internationally



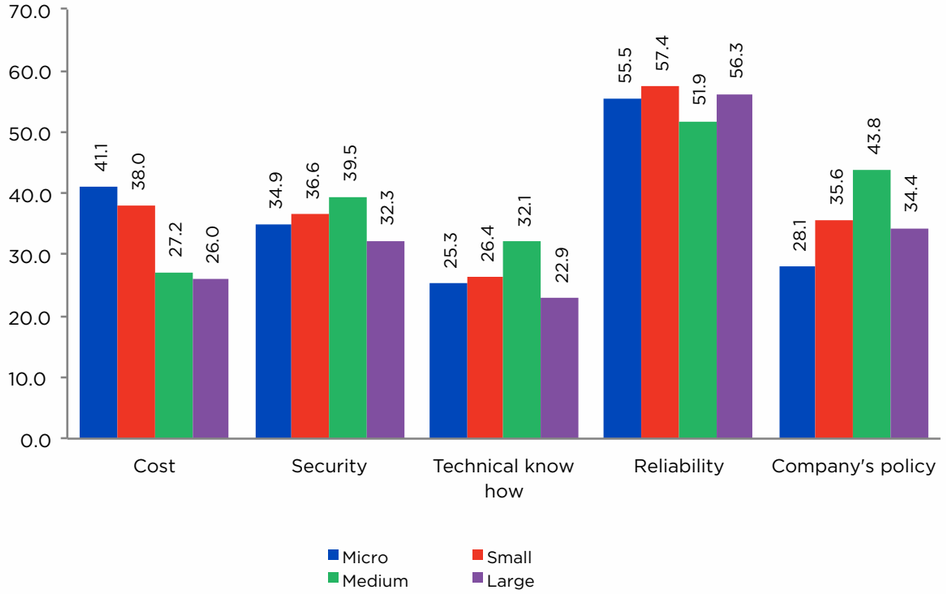
Analysis of hosting website by location and economic activity is shown in Table 4.5. Construction activities (73.8 per cent) had the highest proportion of firms hosting websites locally followed by those in human health and social work activities at 72.7 per cent. On the other hand, information and communication (48.5 per cent) had the largest proportion of firms hosting their website international followed by horticultural firms at 46.3 per cent in 2015.

Table 4. 5: Proportion of Enterprises by Website Hosting Location and by Economic Activity

Economic Activity	Local	International
Agriculture, forestry and fishing (horticulture only)	52.5	46.3
Mining and quarrying	60.0	40.0
Manufacturing	63.7	33.0
Electricity, gas, steam and air conditioning supply	60.0	40.0
Water supply; sewerage, waste management and remediation activities	66.7	16.7
Construction	73.8	23.1
Wholesale and retail trade	65.4	31.9
Transportation and storage	62.7	36.5
Accommodation and food service activities	54.0	43.6
Information and communication	50.0	48.5
Financial and insurance activities	64.0	33.7
Real estate	63.5	34.9
Professional, scientific and technical activities	60.2	37.7
Administrative and support service activities	55.3	42.1
Education	54.2	41.7
Human health and social work activities	72.7	22.7
Arts, entertainment and recreation	64.3	28.6
Other service activities	57.9	42.1
Total	**60.9**	**36.7**

The main reason for hosting websites internationally was reliability of the service while availability of technical expertise was the least cited reason as shown in Figure 4.20.

Figure 4. 20: Proportion of Enterprises Hosting Websites Internationally by Reason



4.4.4 Website Updating

The frequency of updating a website is an important element in Search Engine Optimization (SEO). Frequently updated websites are more likely to rank high in search engine results and hence visibility of an enterprises product or service is more noticeable. Table 4.6 presents the frequency of website updating as reported by surveyed enterprises.

Overall, 21.0 per cent of enterprises updated their websites on a monthly compared to 19.8 per cent that did so on a quarterly basis. Analysis by firm size show that most micro firms (20.4 per cent) updated their websites annually, small enterprises (20.6 per cent) updated quarterly, while medium (20.9 per cent) and large (26.9 per cent) firms updated their websites on monthly basis.

Table 4. 6: Proportion of Enterprises Updating Website by Frequency

Frequency	Micro	Small	Medium	Large	Total
Daily	4.4	8.2	6.9	10.3	**7.2**
Weekly	9.4	12.1	16.5	12.0	**12.4**
Monthly	19.7	19.9	20.9	26.9	**21.0**
Quarterly	19.7	20.6	19.3	18.6	**19.8**
Semi- annual	8.3	7.0	5.9	4.5	**6.8**
Annually	20.4	18.1	17.6	17.4	**18.5**
More than a year	10.3	8.9	8.1	7.4	**8.9**
Non response	7.9	5.1	4.8	2.9	**5.5**

4.4.5 Type of Content on Businesses' Websites

Advertisement of products is the most common feature in websites as reported by 65.1 per cent of enterprises as shown in Table 4.7. The use of website to advertise was popular across all firm sizes. The presence of product catalogues, which is related to advertisement, is the second most popular feature and was reported by 56.7 per cent of enterprises with a website. The least common feature was the possibility for visitors to customize or design products.

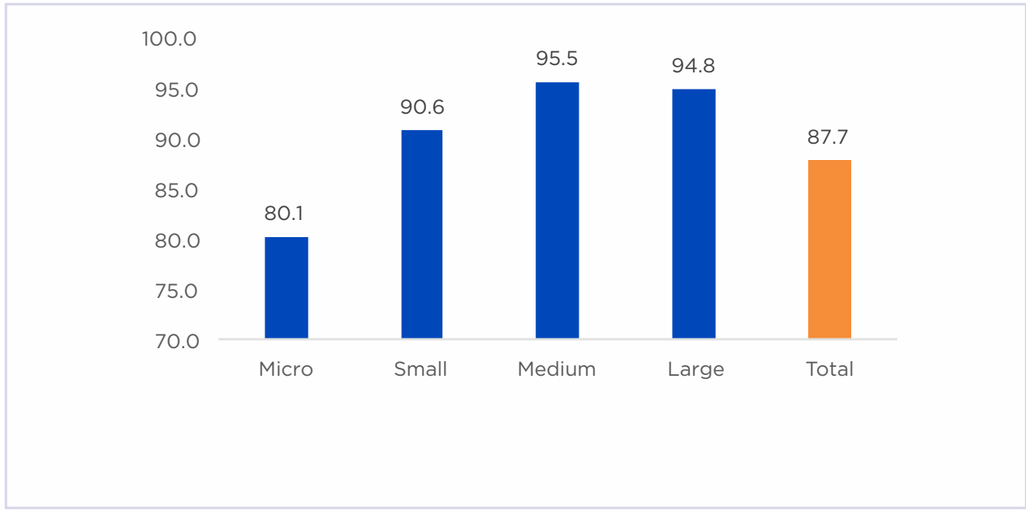
Table 4. 7: Proportion of Enterprises with Website by Type of Features

Type of Features	Micro	Small	Medium	Large	Total
Advertisement	59.1	67.0	64.6	71.3	**65.1**
Product catalogues or price lists	51.0	55.2	61.6	63.0	**56.7**
Customer feedback	54.3	53.4	55.0	54.8	**54.2**
Personalized web page/content in the website for regular/repeated clients	30.6	29.8	30.4	28.7	**30.0**
Privacy policy statement	25.0	27.0	32.6	40.4	**29.7**
Online ordering facility for your business products	22.5	23.3	28.7	24.8	**24.5**
Security policy statement	18.2	15.3	16.9	24.3	**17.6**
Provision of online after sales support	12.4	13.9	16.9	15.2	**14.4**
Facility for online payment	11.6	13.1	15.5	14.8	**13.5**
Privacy seal or certification	9.1	9.6	12.7	12.6	**10.6**
Possibility for visitors to customize or design the products	8.3	9.1	8.8	9.6	**8.9**
Others	0.0	0.0	0.0	0.4	**0.1**

4.4.6 Enterprises with Email address

Email is an electronic mail that is exchanged over network/telecommunications between users. It is a preferred communication tool based on characteristics of speed, accessibility, availability and cost effectiveness. Overall, 87.7 per cent of enterprises reported that they had a business email address in 2015. From these enterprises, medium sized enterprises (95.5 per cent) had the largest proportion followed by large enterprises at 94.8 per cent as seen in Figure 4.21.

Figure 4. 21: Proportion of Enterprises with a Business Email Address by Enterprise Size



4.4.7 Use of Social Media

The widespread availability of social media influences enterprises to consider using the platforms to connect their businesses to clients, partners and suppliers. The use of social media has become more acceptable and formalized as a means of communication by enterprises locally and globally.

The use of social networking sites such as Facebook and Google+ was common across all enterprises but tended to increase with the size of the enterprise. Use of the social networking sites was reported by 79.0 per cent of enterprises as shown in Table 4.8. Microblogs such as twitter provide avenues for rapid feedback with clients. A significant proportion of medium and large sized firms used microblog sites at 40.5 per cent and 45.8 per cent, respectively. On the other hand, instant messaging such as WhatsApp was more common among micro and small enterprises with 49.1 per cent and 44.1 per cent using the service, respectively. Video and photo sites were used by a higher proportion of medium and large enterprises compared to micro and small enterprises.

Table 4. 8: Proportion of Enterprises by Type of Social Networking Websites

Type of Social Network	Micro	Small	Medium	Large	Total
Social networking sites	72.3	79.5	84.9	87.3	**79.0**
Microblog sites	22.4	27.0	40.5	45.8	**30.1**
Instant messaging	49.1	44.1	31.6	31.3	**42.0**
Linked-In	16.4	17.7	21.3	29.5	**19.2**
Video sites	11.0	12.4	21.0	28.3	**15.3**
Photo sites	6.0	8.0	14.4	18.7	**9.7**
Blogs	4.6	5.1	8.2	7.2	**5.8**

4.5 Electronic Commerce

Electronic transactions are at the core of statistical measurement for businesses using ICTs. Principally, e-commerce is part of the business model of enterprises, complementing their conventional commercial activities for selling and buying aimed at enhancing their performance.

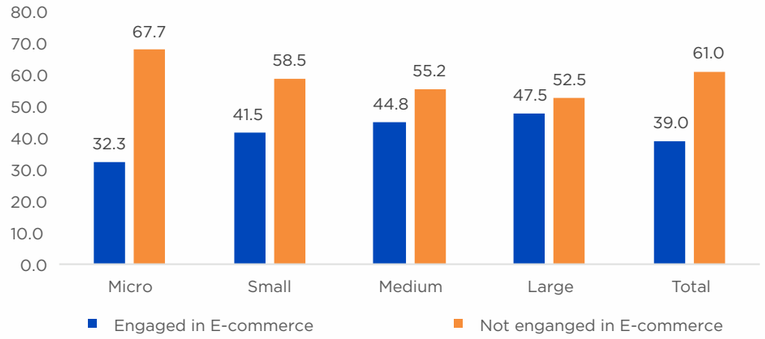
Electronic commerce is the trading or facilitation of trade in products or services through on-line applications used in automated transactions such as web pages, extranets and other applications that run over the Internet such as electronic data interchange (EDI) over the Internet or over any other web-enabled application regardless of how the web is accessed (e.g. through a mobile phone, computer, ipad etc). The payment and ultimate delivery of goods or services may be conducted on or off line. Electronic commerce may be further categorized as domestic or cross-border.

E-commerce offers potential benefits to enterprises in the form of enhanced participation in international value chains, increased market access and reach, improved internal and market efficiency and lower transaction costs. The survey focused on both domestic and cross border e-commerce activities. The survey also took into consideration types of e-commerce activity that is, buying or selling via Internet using automated systems and via email.

4.5.1 Uptake of E- Commerce

This section presents findings on e-commerce carried through automated systems including both buying and selling. According to survey findings, 39.0 per cent of the surveyed firms engaged in either purchasing or selling over the Internet using the automated systems, while 61.0 per cent did not as seen in Figure 4.22. Analysis of the uptake of e-commerce by firm size show that large firms (47.5 per cent) had the largest proportion. Over two thirds of micro enterprises did not engage in e-commerce in 2015.

Figure 4. 22: Proportion of Enterprises Engaged in E-Commerce



Information and communication activies had the highest proportion of enterprises engaged in e-commerce at 62.9 per cent while 87.5 per cent of the surveyed firms in mining and quarrying did not engage in e-commerce as seen in Table 4.9.

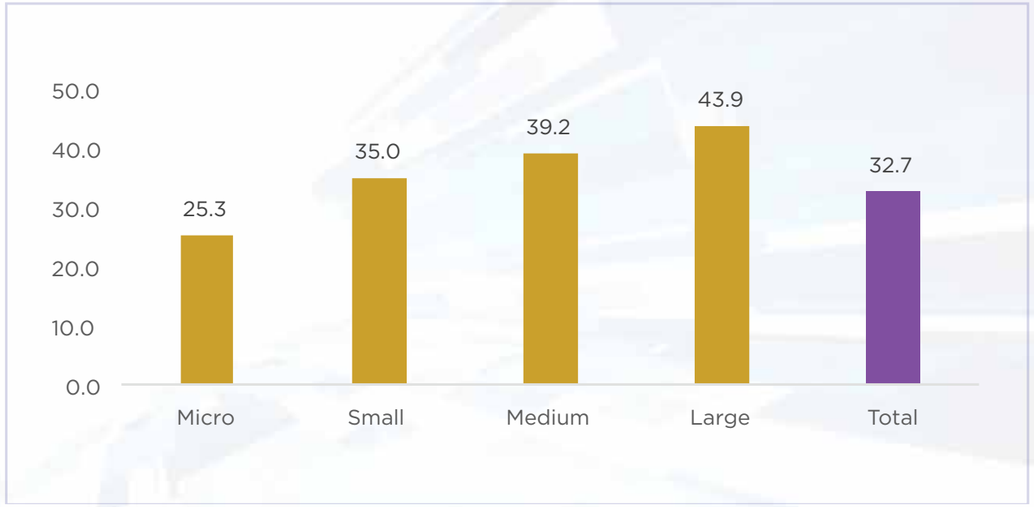
Table 4. 9: Proportion of Enterprises Engaged in E-commerce by Economic Activity

Economic Activity	Engaged in E-commerce	Did not Engage in E-commerce
Agriculture, forestry and fishing (horticulture only)	32.2	67.8
Mining and quarrying	12.5	87.5
Manufacturing	40.9	59.1
Electricity, gas, steam and air conditioning supply	50.0	50.0
Water supply; sewerage, waste management and remediation activities	33.3	66.7
Construction	31.0	69.0
Wholesale and retail trade	33.1	66.9
Transportation and storage	39.9	60.1
Accommodation and food service activities	45.2	54.8
Information and communication	62.9	37.1
Financial and insurance activities	44.8	55.2
Real estate	34.3	65.7
Professional, scientific and technical activities	44.6	55.4
Administrative and support service activities	48.8	51.2
Education	30.3	69.7
Human health and social work activities	35.9	64.1
Arts, entertainment and recreation	46.2	53.8
Other service activities	36.5	63.5
Total	**39.0**	**61.0**

4.5.2 Online Purchases

Out of the firms that engaged in e-commerce, 32.7 per cent purchased goods and services online as shown in Figure 4.23. The highest proportion of enterprises that engaged in online purchases were large firms at 43.9 per cent. About one quarter of micro enterprises engaged in online purchases.

Figure 4. 23: Proportion of Enterprises Engaged in Online Purchasing by Firm Size



The highest proportion of firms that engaged in online purchasing were those in information and communication activities at 56.0 per cent followed by those in electricity, gas, steam and air conditioning at 50.0 per cent as presented in Table 4.10. Mining and quarrying activities had the lowest proportion of firms making purchases online at 12.5 per cent.

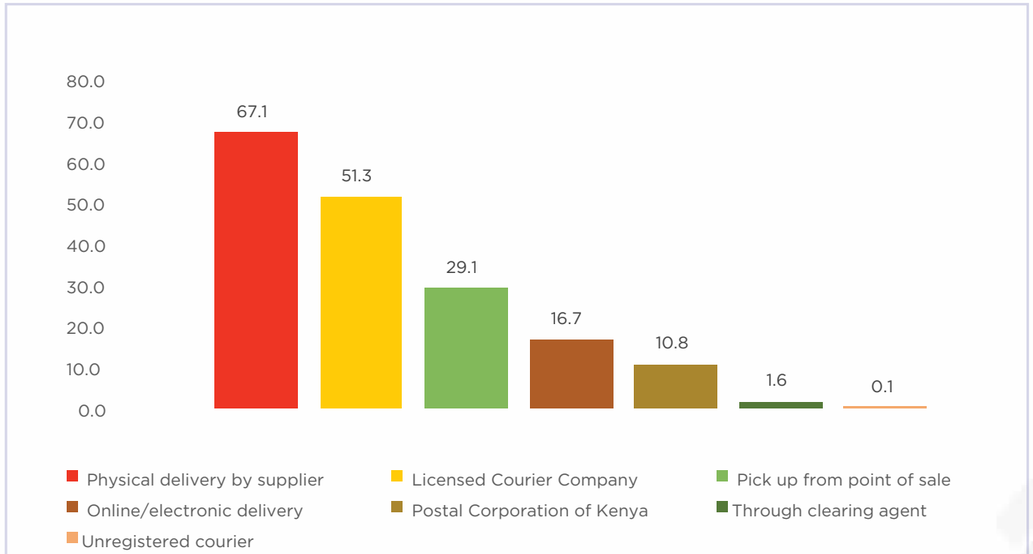
Table 4. 10: Proportion of Firms Engaged in Online Purchasing

Economic Activity	Per cent
Agriculture, forestry and fishing (horticulture only)	27.1
Mining and quarrying	12.5
Manufacturing	36.4
Electricity, gas, steam and air conditioning	50.0
Water supply; sewerage, waste management and remediation activities	33.3
Construction	23.5
Wholesale and retail trade; repair of motor vehicles and motorcycles	28.7
Transportation and storage	33.0
Accommodation and food service activities	35.4
Information and communication	56.0
Financial and insurance activities	41.4
Real estate activities	23.9

Economic Activity	Per cent
Professional, scientific and technical activities	34.9
Administrative and support service activities	38.6
Education	24.2
Human health and social work activities	30.8
Arts, entertainment and recreation	34.6
Other service activities	30.2
Total	32.7

Figure 4.24 presents the proportion of enterprises engaged in online purchasing by mode of delivery. About two thirds (67.1 per cent) of the enterprises that engaged in online purchasing reported to have received the products through the supplier while 51.3 per cent of firms received the products through licensed courier companies.

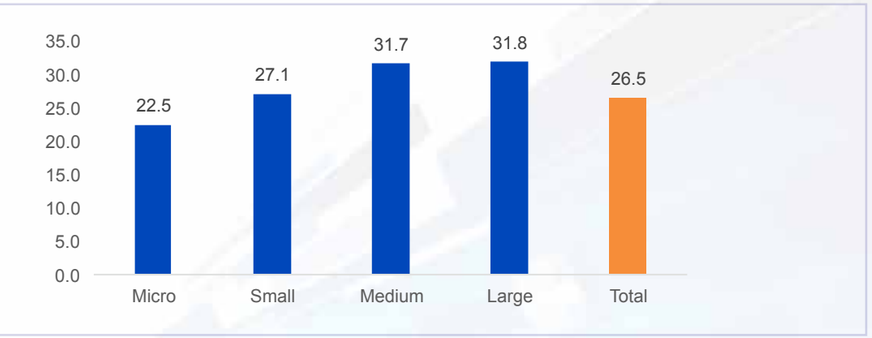
Figure 4. 24: Proportion of Enterprises Engaged in Online Purchase, by Mode of Delivery



4.5.3 Online Selling

According to the survey, 26.5 per cent of the firms sold their products online as seen in Figure 4.25. Large and medium sized enterprises had the largest proportion of firms selling online at 31.8 per cent and 31.7 per cent, respectively.

Figure 4. 25: Proportion of Enterprises Engaged in Online selling, by Firm Size



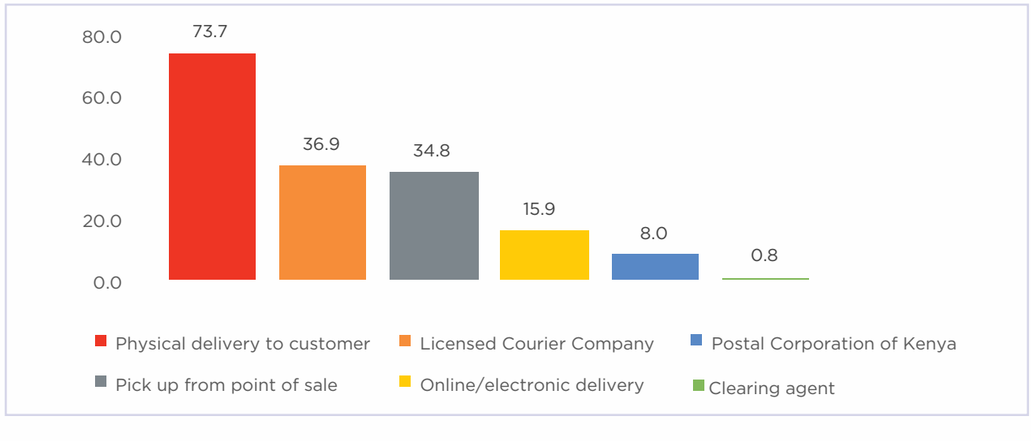
Information and communication activities had the largest proportion of firms engaged in online selling at 40.9 per cent followed by accommodation and food service and administrative and support service activities at 36.1 per cent as shown in Table 4.11. Firms in mining and quarrying activities did not report to have sold online in 2015.

Table 4. 11: Proportion of Enterprises Engaged in Online Selling

Economic Activity	Per cent
Agriculture, forestry and fishing (horticulture only)	22.9
Mining and quarrying	0.0
Manufacturing	27.0
Electricity, gas, steam and air conditioning	31.3
Water supply; sewerage, waste management and remediation activities	22.2
Construction	22.1
Wholesale and retail trade; repair of motor vehicles and motorcycles	20.9
Transportation and storage	29.1
Accommodation and food service activities	36.1
Information and communication	40.9
Financial and insurance activities	25.9
Real estate activities	29.1
Professional, scientific and technical activities	28.4
Administrative and support service activities	36.1
Education	27.3
Human health and social work activities	20.5
Arts, entertainment and recreation	34.6
Other service activities	27.0
Total	**26.5**

Most enterprises that sold goods online delivered physically to customers (73.7 per cent) and by use of licensed courier companies (36.9 per cent) as seen in Figure 4.26.

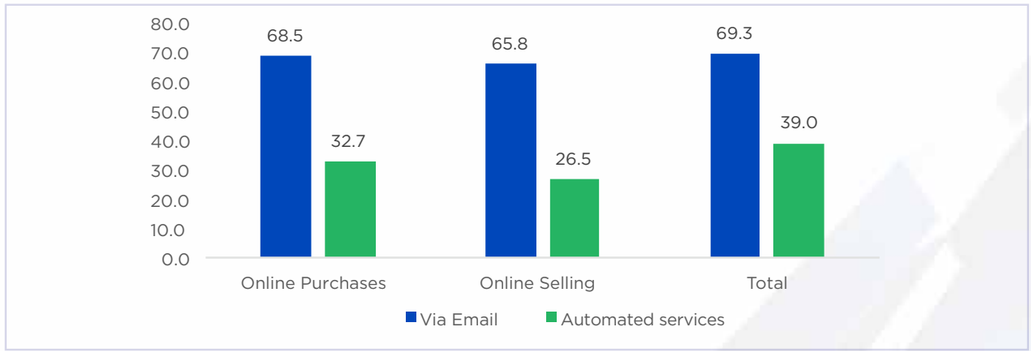
Figure 4. 26: Proportion of Enterprises Engaged in Selling Online, by Mode of Delivery



4.5.4 Online Transactions via Email

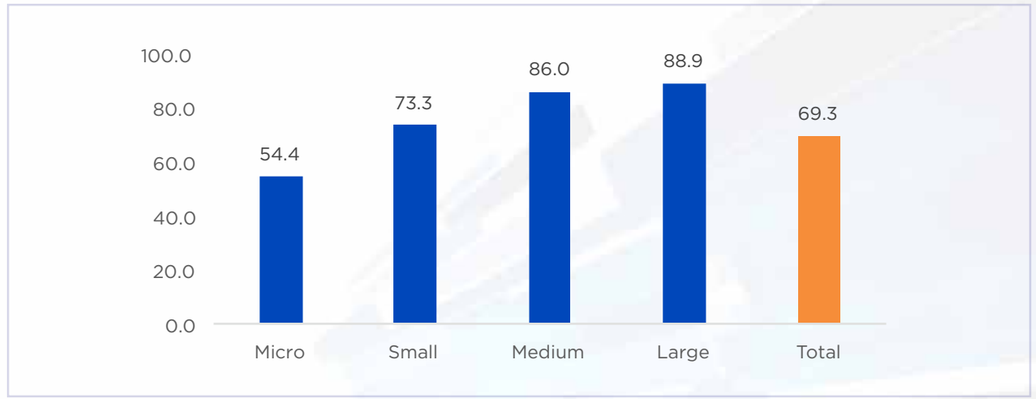
This section presents survey findings on e-commerce through emails. To capture the uptake of e-commerce, it is recommended that online transactions done via automated systems be analysed separately from those done via email. The proportion of online transactions via email was higher (69.3 per cent) than via automated services (39.0 per cent) as presented in Figure 4.27. The findings also show that, out of all firms that used email to transact, 68.5 per cent and 65.8 per cent of them purchased and sold products, respectively.

Figure 4. 27: Proportion of Enterprises Engaged in Online Transactions via Email



Analysis of enterprises engaged in online transactions through email by firm size show that large firms (88.9 per cent) had the highest proportion while micro firms had the lowest proportion at 54.4 per cent.

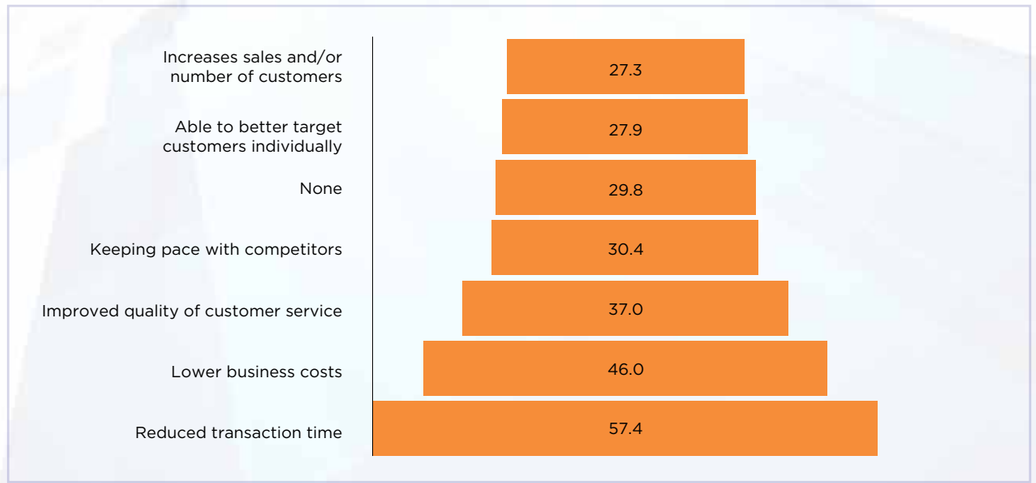
Figure 4. 28: Proportion of Enterprises Engaged in Online Transactions via Email, by Firm Size



4.5.5 Benefits Accruing from Online Buying and Selling

The survey further looked into the benefits realized by enterprises from online buying and selling. As seen in Figure 4.29, the greatest benefit was reduction in transaction time (57.4 per cent) followed by reduced business costs at 46.0 per cent. Increased sales and number of customers was cited as an accrued benefit by 27.3 per cent of the firms that transacted online in 2015. However, 29.8 per cent of the enterprises that transacted online did not realize any benefit from it.

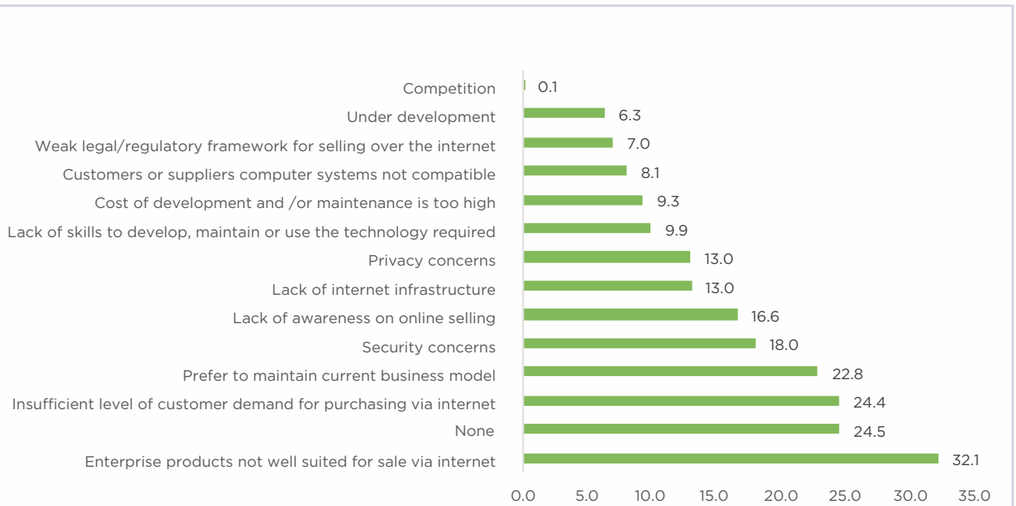
Figure 4. 29: Benefits Accruing from Online Buying or Sell



4.5.6 Limitations of Online Selling and Buying

According to the survey, 32.1 per cent of the enterprises reported that their products were not well suited for sale via Internet whereas 24.5 per cent of the enterprises did not find any limitations with online selling or buying as seen in Figure 4.30.

Figure 4. 30: Limitations of Online Selling or Buying

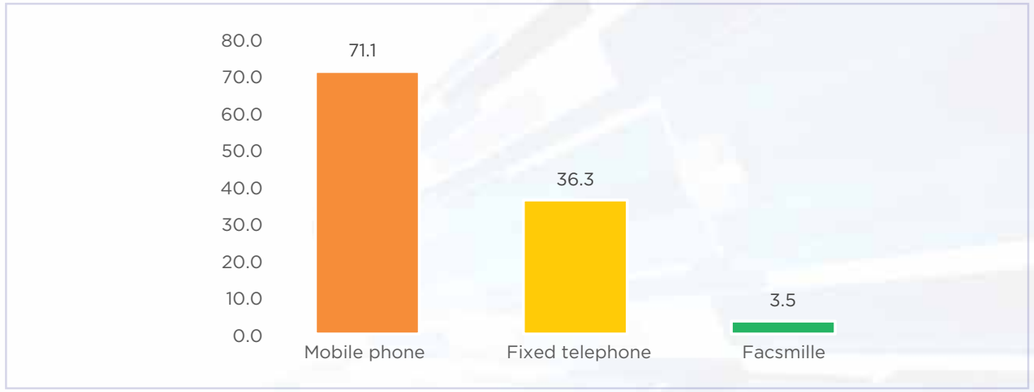


4.5.7 M-Commerce

Mobile applications facilitate easy access to new markets and lead to sustainable development with its potential to reach the masses in the developing world. Mobile connectivity and increased use of mobile devices, therefore, provide tremendous opportunities for businesses to have a wide range of services rendered at any time and any place. Due to the high uptake of mobile devices, enterprises have embraced mobile technologies by using them in their commercial activities. M-commerce systems have naturally emerged as a result of e-commerce systems and have progressed from simple transfer of e-commerce principles to mobile applications, being stored and operating on mobile devices in a protected environment, to provide strong multifactor authentication, data encryption and menu usability. Mobile devices offer voice based services, web based services, SMS or USSD-based services and services based on special applications that are used to trade in the business environment.

The survey sought to establish the uptake of m-commerce. In this context, m-commerce also include the use of fixed telephones and fax machines for m-commerce. The survey findings indicate that 71.1 per cent of enterprises bought or sold goods and services via mobile phones while 36.3 per cent engaged in m-commerce via fixed telephones as shown in Figure 4.31.

Figure 4. 31: Proportion of Enterprises Using M-Commerce



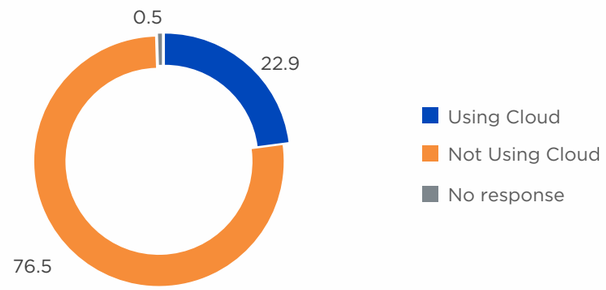
4.5.8 Cloud Computing

This section presents findings on the use of cloud computing services by enterprises. Cloud computing is an emerging IT development, deployment and delivery model, enabling service users to have ubiquitous, convenient and on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications, and services), that can be rapidly provisioned and released with minimal management effort or service-provider interaction. Cloud computing enables deployment of cloud services where products and solutions are delivered and consumed on demand, at any time, through any access network, using any connected devices and cloud computing technologies.

4.6 Use of Cloud Computing Services

Out of the total surveyed firms, 22.9 per cent used cloud computing services as shown in Figure 4.32.

Figure 4. 32: Proportion of Enterprises Using Cloud Computing



Analysis on the use of cloud computing services by firm size indicate that 38.7 per cent of large and 35.3 per cent of medium enterprises used the service as seen in Table 4.12. Information and communication activities had the highest proportion of enterprises using cloud computing services at 45.9 per cent while water supply; sewerage, waste management and remediation activities had the least proportion of enterprises using the service at 11.1 per cent.

Table 4. 12: Proportion of Enterprises Using Cloud Computing, by Firm Size

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	20.0	20.0	40.7	36.6	**34.7**
Mining and quarrying	0.0	0.0	40.0	100.0	**37.5**
Manufacturing	13.5	21.4	24.4	41.9	**25.1**
Electricity, gas, steam and air conditioning supply	16.7	16.7	25.0	0.0	**18.8**
Water supply; sewerage, waste management and remediation activities	0.0	33.3	0.0	0.0	**11.1**
Construction	10.5	21.9	36.0	42.9	**20.2**
Wholesale and retail trade	8.8	19.0	33.1	34.4	**15.6**
Transportation and storage	18.6	32.5	40.0	29.2	**29.6**
Accommodation and food service activities	15.8	15.2	33.3	31.3	**19.8**
Information and communication	35.8	45.8	65.2	70.0	**45.9**
Financial and insurance activities	20.5	34.1	34.6	60.0	**31.9**
Real estate	13.2	25.9	66.7	0.0	**21.6**
Professional, scientific and technical activities	22.4	32.6	61.1	16.7	**28.0**
Administrative and support service activities	16.3	17.6	31.6	43.8	**21.1**
Education	50.0	0.0	75.0	100.0	**33.3**
Human health and social work activities	15.0	11.1	50.0	0.0	**17.9**
Arts, entertainment and recreation	11.1	27.3	66.7	0.0	**30.8**
Other service activities	20.8	33.3	33.3	33.3	**28.6**
Total	14.5	22.9	35.3	38.7	**22.9**

4.6.1 Plans to Adopt Cloud Computing in Future

Among enterprises that had not deployed cloud computing services, 12.5 per cent had plans to adopt cloud services within 12 months, 16.7 per cent had plans to deploy after a year and 67.9 per cent had no plans as seen in Figure 4.33. In addition, 72.6 per cent of micro enterprises had no plans to adopt cloud computing.

Figure 4. 33: Proportion of Enterprises Planning to Adopt Cloud Computing, by Firm Size



Out of the firms that did not use cloud computing, one quarter of the firms in arts, entertainment and recreation planned to adopt cloud computing within one year while 30.0 per cent of enterprises in education activities planned to adopt it within the same period. Almost 90.0 per cent of firms in water supply; sewerage, waste management and remediation activities had no plans to adopt cloud computing as seen in Table 4.13.

Table 4. 13: Proportion of Enterprises Planning to Adopt Cloud Computing by Economic Activity

Economic Activity	Within 12 months	More than 12 months	No plan
Agriculture, forestry and fishing (horticulture only)	13.2	18.4	65.8
Mining and quarrying	0.0	20.0	80.0
Manufacturing	13.6	20.2	64.6
Electricity, gas, steam and air conditioning	14.3	21.4	50.0
Water supply; sewerage, waste management and remediation activities	0.0	12.5	87.5
Construction	12.9	16.5	68.2
Wholesale and retail trade; repair of motor vehicles and motorcycles	8.8	12.3	75.7
Transportation and storage	14.6	19.4	63.9
Accommodation and food service activities	12.7	18.3	66.5
Information and communication	15.5	20.2	61.9
Financial and insurance activities	18.4	25.0	55.3
Real estate activities	14.2	16.0	65.1

Economic Activity	Within 12 months	More than 12 months	No plan
Professional, scientific and technical activities	17.9	21.2	55.7
Administrative and support service activities	18.9	18.2	58.3
Education	10.0	30.0	60.0
Human health and social work activities	8.8	23.5	67.6
Arts, entertainment and recreation	25.0	25.0	50.0
Other service activities	10.0	5.0	80.0

4.6.2 Type of Cloud Computing Activities

Email and messaging was the most popular cloud computing activity as reported by 73.9 per cent of the respondents. This is reflected in all the enterprise sizes as presented in Table 4.14. The second most adopted mode of cloud computing was Data Storage at 64.9 per cent while Enterprise service bus was the least used.

Table 4. 14: Proportion of Enterprises Using Cloud Computing by Type of Service

Cloud Computing Services	Micro	Small	Medium	Large	Total
Application hosting	16.8	21.2	34.7	35.6	**25.5**
Data storage	64.0	66.3	68.9	55.9	**64.9**
Email and messaging	72.6	74.7	73.5	74.6	**73.9**
Customer relationship Management	14.2	13.1	14.3	11.0	**13.4**
Server capacity	13.7	21.5	29.1	19.5	**21.2**
Application development	9.6	8.4	9.7	14.4	**9.9**
Business specific	8.6	10.1	8.2	12.7	**9.7**
Finance and enterprise resource planning	12.2	11.1	13.3	12.7	**12.1**
Desktop/office software	27.9	26.3	29.6	22.9	**27.0**
Content management system/ Document management system	16.8	15.2	15.8	16.1	**15.8**
Business Intelligence	6.6	8.4	10.7	8.5	**8.5**
Business process manager on cloud	3.6	5.7	4.1	4.2	**4.6**
Enterprise Service Bus	0.5	2.4	3.1	0.0	**1.7**

4.6.3 Benefits of Using Cloud Computing Services

The proportion of enterprises by type of benefit accrued from cloud computing is presented in Table 4.15. Flexibility (77.3 per cent) was the most cited benefit realised by enterprises followed by cost savings (61.1 per cent). Greater business focus and improved security were perceived as the least benefit as reported by 23.2 per cent and 16.6 per cent of the enterprises, respectively.

Table 4. 15: Proportion of Enterprises Using Cloud Computing by Type of Benefits and Firm Size

Type of Benefits	Micro	Small	Medium	Large	Total
More flexibility	73.0	79.3	77.2	79.8	77.3
Cost savings	63.5	54.4	68.8	61.4	61.1
Better scalability	30.7	36.5	53.4	50.9	41.3
Complexity reduction	36.5	36.8	42.9	39.5	38.6
More (Core) business focus	18.5	24.6	25.9	22.8	23.2
Collaboration	22.8	26.0	33.3	30.7	27.7
Automatic Software updates	30.7	27.4	34.4	28.9	30.1
Improved security	17.5	14.7	16.9	19.3	16.6
Disaster recovery	29.1	39.6	49.2	48.2	40.7

4.6.4 Barriers to Adoption of Cloud Computing

Out of the firms that had not deployed cloud computing, 39.8 per cent of enterprises were at the stage of developing it. Large firms expressed security concerns as one of the main reason for not deploying cloud services while 42.4 per cent of micro enterprises cited insufficient knowledge within the organisation as a major hindrance as seen in Table 4.16.

Table 4. 16: Proportion of Enterprises Not Adopted Cloud Computing by Type of Reason

Type of Barriers	Micro	Small	Medium	Large	Total
Insufficient knowledge within the organization	42.4	36.8	31.4	17.1	**37.1**
Cost is high	12.4	15.3	18.1	22.3	**14.9**
Insufficient regulatory framework	5.1	6.7	11.2	7.4	**6.7**
Security concerns	8.2	16.1	25.4	36.0	**15.3**
Under development	42.7	40.7	30.2	34.9	**39.8**
Insufficient technical capacity	0.3	0.0	2.1	1.1	**0.5**
Corporate policy	0.7	0.7	1.2	1.7	**0.8**

Chapter 5

ICT Management and Security

Chapter 5. ICT Management and Security

5.1 ICT Management

ICT management involves the implementation and maintenance of organisations ICT systems with reference to its guiding policies and procedures. It requires the monitoring of the organisations' operational requirements, research and implementation of strategies in order to build a cost-effective and efficient system.

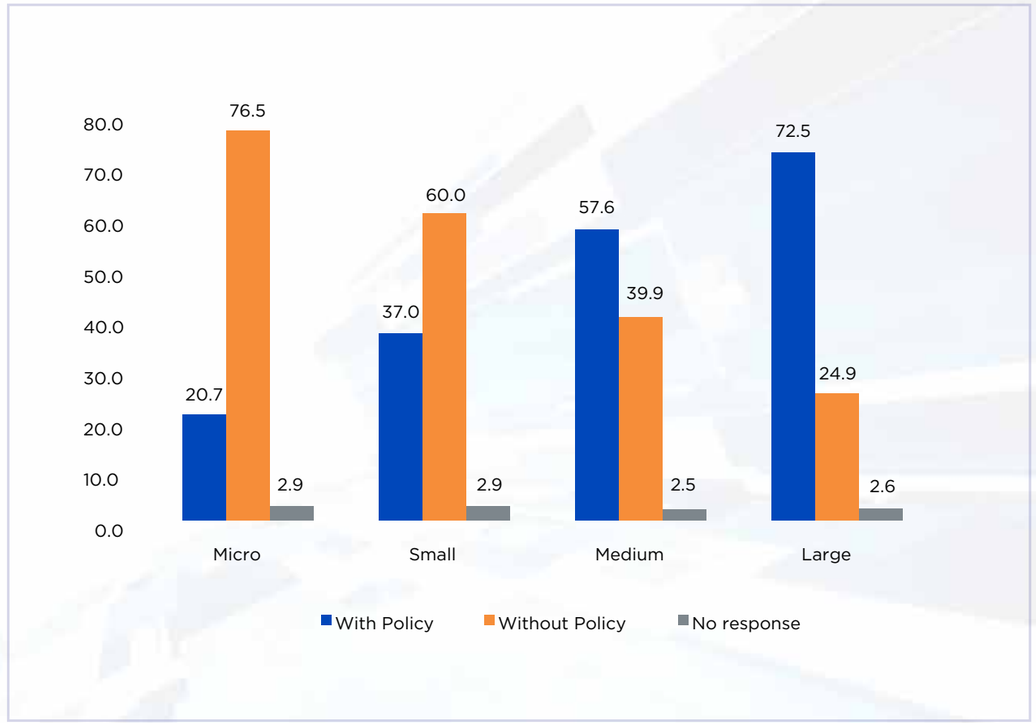
5.2 Information Technology (IT) Policy

An enterprise's IT Policy contains the framework and guidelines for use and management of its information technology resources. The survey sought to establish whether enterprises had IT policies at the time of the data collection. Overall, 37.0 per cent of the enterprises reported having had an IT policy in place. The survey revealed a positive correlation between the enterprise size and having an IT policy with 72.5 per cent of large enterprises and 20.7 per cent of the micro enterprises reporting to have policies in place.

Table 5. 1: Proportion of Enterprises with an IT Policy by Size

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	20.0	40.0	63.0	62.0	**57.6**
Mining and quarrying	100.0	100.0	80.0	100.0	**87.5**
Manufacturing	23.0	30.2	38.8	77.4	**40.9**
Electricity, gas, steam and air conditioning	33.3	50.0	75.0	0.0	**50.0**
Water supply; sewerage, waste management and remediation activities	20.0	33.3	0.0	100.0	**33.3**
Construction	14.5	21.9	40.0	57.1	**22.5**
Wholesale and retail trade; repair of motor vehicles and motorcycles	15.5	32.1	56.5	71.9	**27.2**
Transportation and storage	28.8	58.8	70.0	79.2	**54.7**
Accommodation and food service activities	13.2	26.6	66.7	81.3	**35.7**
Information and communication	34.3	74.6	87.0	100.0	**61.0**
Financial and insurance activities	28.2	65.9	96.2	100.0	**62.9**
Real estate activities	25.0	38.9	77.8	66.7	**35.1**
Professional, scientific and technical activities	24.7	49.5	88.9	66.7	**37.7**
Administrative and support service activities	23.8	43.1	47.4	50.0	**34.9**
Education	33.3	20.0	75.0	100.0	**36.4**
Human health and social work activities	35.0	33.3	50.0	75.0	**41.0**
Arts, entertainment and recreation	22.2	36.4	50.0	0.0	**34.6**
Other service activities	29.2	28.6	66.7	55.6	**38.1**
Total	**20.7**	**37.0**	**57.6**	**72.5**	**37.0**

Figure 5. 1: Proportion of Enterprises with an IT Policy



5.3 Use of Computer Operating Systems

The survey endeavoured to establish the deployment of the various operating systems in enterprises. Table 5.2 presents details on the proportion of enterprises with computers by type of operating system. Overall, 95.3 per cent of all computers were using windows as the operating system. Only 2.2 and 2.1 per cent of the computers were reported to run on Macintosh and Linux, respectively. Use of Linux was most prevalent in the enterprises engaged in accommodation and food service activities where 8.4 per cent of the enterprises' computers were reported to run on it. Entities in the Information and communication also indicated significant use of Macintosh at 7.0 per cent. Linux was widely reported to be in use by businesses in arts, entertainment and recreation and their counter parts in the electricity, gas, steam and air conditioning at 9.2 and 8.5 per cent, respectively.

Table 5. 2: Proportion of Computers Installed with the Various Operating Systems by Economic Activity

Economic Activity	Windows	Linux	Macintosh	Unix	Android	Other OS
Agriculture, forestry and fishing (horticulture only)	96.8	1.3	1.7	0.1	0.0	0.0
Mining and quarrying	93.6	3.2	2.8	0.3	0.0	0.1
Manufacturing	98.7	0.6	0.7	0.0	0.0	0.0
Electricity, gas, steam and air conditioning	86.4	8.5	5.0	0.0	0.0	0.0
Water supply; sewerage, waste management and remediation activities	97.0	1.3	1.3	0.4	0.0	0.0
Construction	97.4	0.6	1.5	0.4	0.0	0.0
Wholesale and retail trade; repair of motor vehicles and motorcycles	99.8	0.0	0.3	0.0	0.0	0.0
Transportation and storage	94.6	4.1	1.1	0.2	0.0	0.0
Accommodation and food service activities	90.6	0.9	8.4	0.1	0.0	0.0
Information and communication	85.0	7.2	7.0	0.2	0.0	0.7
Financial and insurance activities	95.7	2.2	1.7	0.3	0.0	0.2
Real estate activities	93.5	5.4	1.2	0.0	0.0	0.0
Professional, scientific and technical activities	92.4	1.1	6.5	0.0	0.0	0.0
Administrative and support service activities	94.0	2.0	3.5	0.3	0.0	0.2
Education	94.6	2.7	2.7	0.0	0.0	0.0
Human health and social work activities	97.3	0.9	1.3	0.4	0.0	0.0
Arts, entertainment and recreation	90.8	9.2	0.0	0.0	0.0	0.0
Other service activities	96.4	1.7	1.5	0.1	0.0	0.1
Total	**95.3**	**2.1**	**2.2**	**0.2**	**0.0**	**0.1**

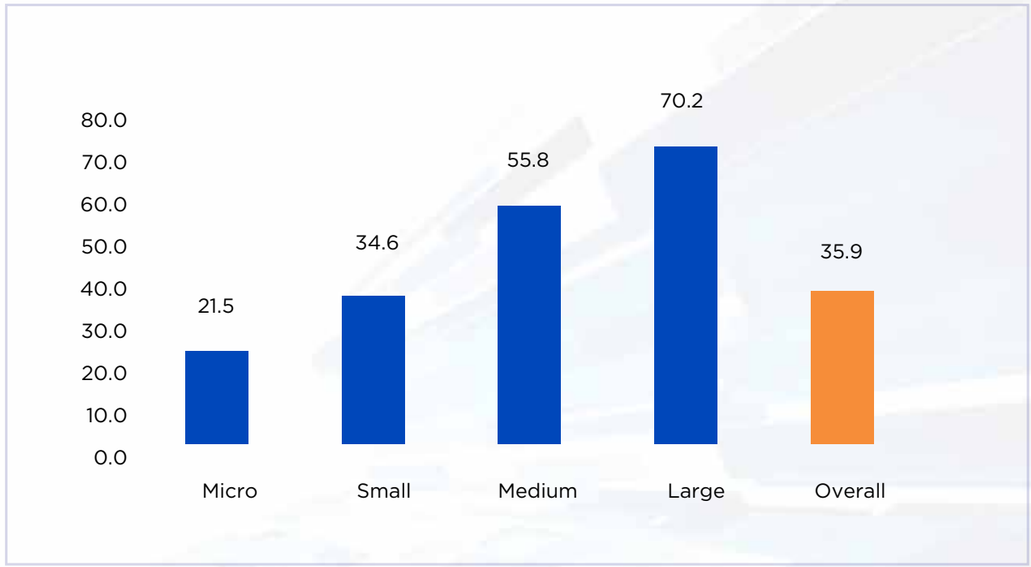
5.4 ICT Security Policy

Information security policies typically contain guidelines on information and system protection requirements and standards; security and network operational guidelines; incident response procedures; the acceptable use of systems; and the enforcement of compliance with regulations and legislation.

An ICT security policy unlike the general IT policy, protects not only information and systems, but also individual employees and the organization as a whole. Users can have regulated access to sensitive information and the opportunity to understand critical systems and exploit potential weaknesses in security.

The survey findings indicate that the overall proportion of enterprises that reported having an ICT security policy was 35.9 per cent. As expected, the proportion of businesses with an ICT security policy increased with the size of the enterprise. For large enterprises, 70.2 per cent had a security policy compared to 21.5 per cent of micro enterprises. This can be explained by the high proportion of micro enterprises in Kenya, which did not have ICT security policies compared to other categories of enterprises.

Figure 5. 2: Proportion of Enterprises with ICT Security Policy



5.5 IT Security Measures

IT security measures are usually taken to prevent compromise, or deliberate or accidental loss of data. The measures are therefore put in place to protect enterprises' information from access or use by unauthorised agents.

The survey sought to establish the type of IT security measures enterprises had in place. Table 5.3 shows the proportion of businesses with IT measures deployed in 2015. Almost all firms surveyed (97.6 per cent) reported to have at least one form of IT security measure. Deployment of IT security measures was found to be most common among large enterprises where 99.7 per cent of the entities reported having at least one form of measure. Antivirus, antispam-ware, computer passwords, regular backups of critical data, and firewalls ranked as the most common IT measures that enterprises had put in place to safeguard themselves from the risk of data loss.

Table 5. 3: Proportion of Businesses by Type of IT Security Measure Taken

Type of IT Security Measures	Enterprise Size				
	Micro	Small	Medium	Large	Total
a) Anti-virus	78.4	89.3	95.6	97.7	**84.9**
b) Anti-spyware	21.0	33.6	52.5	67.4	**34.0**
c) Firewall	31.1	48.6	66.4	81.6	**46.6**
d) Spam filter	25.9	40.4	56.6	74.7	**39.6**
e) Secured communication between clients and servers (eg via SSL, SHTTP)	9.9	22.5	42.5	58.2	**23.5**
f) Authentication software or hardware for internal users	12.4	25.8	49.9	62.5	**27.1**
g) Authentication software or hardware for external users eg customers	6.2	13.7	25.2	33.2	**14.1**
h) Intrusion detection system	6.4	13.5	27.6	39.8	**15.0**
i) Regular back up of data critical to your business operations	28.9	42.8	65.7	82.6	**43.7**
j) Off-site data backup	15.9	23.9	42.3	57.2	**26.1**
k) Computer password	58.0	71.1	82.9	86.2	**67.7**
l) None	19.9	9.0	3.1	2.3	**11.3**
Total*	**95.8**	**98.5**	**99.1**	**99.7**	**97.6**

* Some enterprises reported having more than one type of security measure

5.6 Loss of Data due to attacks by Computer Virus

Loss of data as a result of attacks by computer viruses has significant implications on performance of businesses, as it requires substantial financial resources to resume normal operations. Out of all the enterprises covered in the survey, 29.0 per cent reported having lost data because of computer virus attacks. Education sector had the largest proportion (48.5 per cent) that lost data due to virus attacks followed by those in Agriculture and Construction sectors with proportions of 34.7 per cent.

Large enterprises had the largest (35.7 per cent) proportion of enterprises that reported loss of data due to computer virus attacks followed by medium- sized enterprises at 31.8 per cent. The lowest proportion of enterprises that incurred loss of data was recorded in micro enterprises at 25.4 per cent.

The survey further established that all the large enterprises in mining and quarrying and their counterparts in water supply lost data due to virus attacks. Micro enterprise in education as well as large enterprise in other service activities reported very high levels of virus attacks where two in every three enterprises were victims.

Table 5. 4: Proportion of Businesses that Lost Data through Virus Attacks

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	0.0	26.7	29.6	40.8	**34.7**
Mining and quarrying	0.0	0.0	0.0	100.0	**12.5**
Manufacturing	27.0	30.2	30.0	25.8	**28.8**
Electricity, gas, steam and air conditioning	16.7	16.7	25.0	0.0	**18.8**
Water supply; sewerage, waste management and remediation activities	0.0	33.3	0.0	100.0	**22.2**
Construction	32.9	34.3	44.0	28.6	**34.7**
Wholesale and retail trade; repair of motor vehicles and motorcycles	20.8	26.1	37.9	37.5	**24.9**
Transportation and storage	32.2	30.0	35.0	37.5	**32.5**
Accommodation and food service activities	23.7	34.8	29.4	31.3	**31.9**
Information and communication	35.8	25.4	17.4	40.0	**29.6**
Financial and insurance activities	28.2	29.3	23.1	20.0	**26.7**
Real estate activities	25.0	33.3	22.2	0.0	**27.6**
Professional, scientific and technical activities	30.0	36.8	38.9	50.0	**33.2**
Administrative and support service activities	32.5	33.3	21.1	50.0	**33.1**
Education	66.7	40.0	25.0	50.0	**48.5**
Human health and social work activities	20.0	33.3	50.0	50.0	**30.8**
Arts, entertainment and recreation	22.2	27.3	33.3	0.0	**26.9**
Other service activities	12.5	19.0	44.4	66.7	**27.0**
Total	**25.4**	**30.1**	**31.8**	**35.7**	**29.0**

5.7 Online Crime Experienced by Enterprises

Online crime refers to offences committed through the use of computer systems, hardware and networks including hacking, phishing, identity theft and cyber bullying through Internet.

Cyber criminals have seized opportunities on the Internet, particularly in e-commerce and online banking to defraud and compromise systems of unsuspecting businesses and individuals. Table 5.5 shows the proportion of enterprises that experienced online crime categorized by type of crime. About seven out of ten business enterprises did not experience any form of online crime in 2015. Attacks through computer virus ranked highest with 20.3 per cent of the enterprises having experienced it in 2015.

Table 5. 5: Proportion of Enterprises that Experienced Online Crime by Type

Type of Online Crime	Micro	Small	Medium	Large	Total
Hacking	4.6	6.5	5.9	4.2	**5.1**
Phishing	1.7	3.3	4.8	10.1	**3.3**
Theft of money (online)	0.7	.6	1.1	1.4	**0.7**
Theft of information (online)	1.0	1.5	1.1	1.4	**1.1**
Identity theft	0.5	0.4	1.7	2.8	**0.8**
Website vandalism	1.1	1.6	1.9	3.5	**1.5**
Computer virus	17.7	21.6	23.8	35.1	**20.3**
Attempted Hacking/Theft	0.1	0.0	0.0	0.3	**0.1**
None	80.0	74.4	70.1	60.8	**69.8**

Table 5.6 shows the proportion of enterprises that experienced online crimes in 2015 by economic activity. Generally, the proportion of enterprises that experienced online crime increased in tandem with the size of the enterprise. Enterprises in transportation and storage reported the highest proportion of enterprises that experienced online crime at 8.1 per cent while Electricity, gas, steam and air conditioning supply recorded the lowest proportion at 2.4 per cent.

Table 5. 6: Proportion of Enterprises that Experienced Online Crime, by Economic Activity

Type of IT Security Measures	Enterprise Size				
	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	2.5	5	3.2	7	**6.2**
Mining and quarrying	0	0	7.5	0	**7.5**
Manufacturing	3.7	4.2	3.8	4.8	**4.2**
Electricity, gas, steam and air conditioning supply	2.1	2.1	3.1	0	**2.4**
Water supply; sewerage, waste management and remediation activitiesWater Supply	2.5	4.2	0	12.5	**6.4**
Construction	4.1	3.9	10.5	0	**5.7**
Wholesale and retail trade	2.1	3.3	5	7.4	**3.4**
Transportation and Storage	5.3	7.5	6.3	13.5	**8.1**
Accommodation and food service activities	2.3	2.9	3.4	5.5	**3.2**
Information and communication	6.2	7.6	4.9	8.8	**6.9**
Financial and insurance activities	4.5	4	5.8	7.5	**5.1**
Real estate	2	4.9	4.2	4.2	**3.9**
Professional, scientific and technical activities	4.1	5.3	4.2	18.8	**5.7**
Administrative and support service activities	4.8	5.9	3.3	5.5	**5.2**
Education	7.3	6.7	6.3	12.5	**7.5**
Human health and social work activities	1.3	6.9	8.3	12.5	**8**
Arts, entertainment and recreation	0	2.3	8.3	0	**6.3**
Other service activities	2.1	0	2.8	5.6	**3.6**
Total	**3.8**	**4.8**	**5.3**	**8.4**	**5.1**

5.8 Reporting of Online Crime

The survey established that most online crimes went unreported mainly due lack of knowledge of where to seek help from. Table 5.7 shows that 54.5 per cent and 48.1 per cent of micro and small enterprises that experienced online crime did not report to any authority. Most online crime incidents were reported to Kenya Police Service and ICT Authority. The proportion of enterprises that reported incidents of online crime to the Kenya Computer Incident Response Team- Coordination Centre (National KE-CIRT/CC) was extremely low across enterprises of all sizes compared to other institutions.

Table 5. 7: Proportion of Enterprises that Reported Online Crime

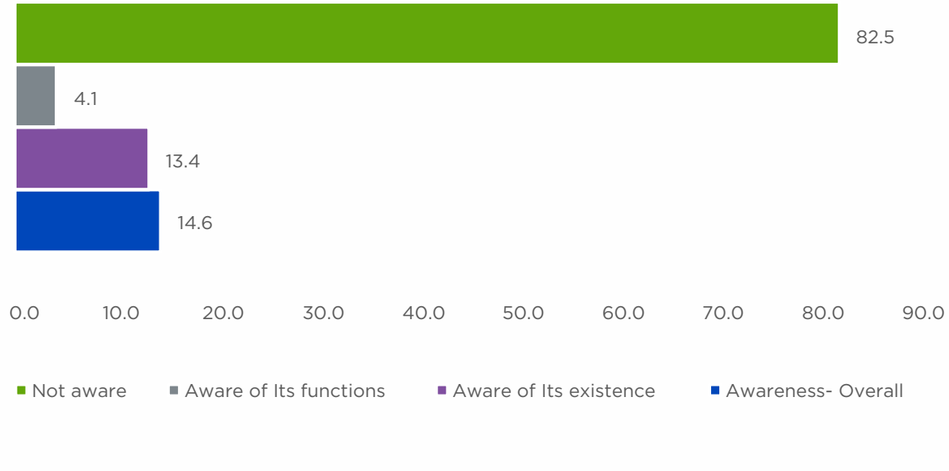
Institution reported to	Micro	Small	Medium	Large
Kenya Police Service	15.2	25.3	36.8	36.4
Communications Authority of Kenya	1.5	7.6	2.6	6.1
ICT Authority	9.1	16.5	21.1	18.2
National Kenya Computer Incident Response Team-Coordination Centre (National	1.5	1.3	0.0	3.0
Central Bank of Kenya	1.5	0.0	2.6	3.0
Engaged IT Consultant	15.2	5.1	0.0	3.0
ISP	4.5	1.3	7.9	3.0
Did not report	54.5	48.1	34.2	39.4
Total	**5.3**	**6.4**	**7.2**	**11.5**

5.9 Awareness of Existence and Functions of National KE-CIRT/CC

The Kenya Computer Incident Response Team - Coordination Centre (National KE-CIRT/CC) is the country's national point of contact for cyber security matters. The National KE-CIRT/CC works with various stakeholders at the national level including law enforcers, private sector, academia, financial sector, and civil society among others. The centre is charged with the responsibility of coordinating response and offering advice on cyber security matters.

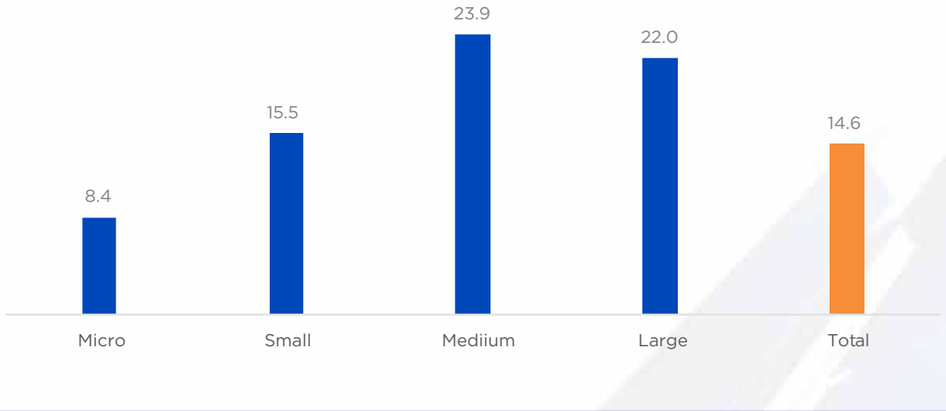
The results of the survey show that majority (82.5 per cent) of enterprises were not aware of the existence of the National KE-CIRT/CC. As seen in Figure 5.3, 4.1 per cent and 13.4 per cent of the enterprises reported to be aware of its functions and its existence, respectively.

Figure 5. 3: Proportion of Enterprises Aware of National KE-CIRT/CC



According to the survey, 23.9 per cent of medium sized enterprises were aware of the centre while only 8.4 per cent of micro enterprises were aware of its existence or functions, or both as seen in Figure 5.4.

Figure 5. 4: Proportion of Enterprises Aware of National KE-CIRT/CC, by Firm Size



5.10 Loss through Online Crime

Over the years, there has been a substantial increase in the number of enterprises transacting businesses online mainly driven by enhanced communication infrastructure, especially availability of faster broadband. Against this background, cyber criminals have taken advantage to infiltrate into business systems and communication channels causing losses to unsuspecting businesses.

Table 5.8 shows the proportion of businesses that incurred losses as a result of online crime. The survey results show that online crime in the form of unauthorised withdrawals led to higher losses than through online transactions. Out of enterprises that transacted online, about one fifth (21.9 per cent) lost over one million Kenya shillings through such transactions. Loss of over 100,000 shillings through unauthorised withdrawals was reported by 58.3 per cent of the enterprises. It is noteworthy that though large enterprises did not report having experienced financial loss through unauthorised withdrawals, about two thirds of the surveyed large enterprises reported financial online transactions losses in excess of KSh 100,000.

Table 5. 8: Proportion of Enterprises that Incurred Financial Loss through Online Crime

Amount	Online Transactions					Unauthorized Withdrawals				
	Enterprise Size					Enterprise Size				
	Micro	Small	Medium	Large	Total	Micro	Small	Medium	Large	Total
< KSh 10,000	33.3	27.3	0.0	0.0	**21.9**	16.7	0.0	0.0	0.0	**8.3**
KSh 10,001 - 50,000	50.0	18.2	18.2	33.3	**31.3**	33.3	0.0	0.0	0.0	**16.7**
KSh 50,001 - 100,000	0.0	0.0	0.0	0.0	**0.0**	33.3	0.0	0.0	0.0	**16.7**
KSh 100,001 - 500,000	8.3	18.2	16.7	33.3	**15.6**	16.7	25.0	100.0	0.0	**33.3**
KSh 500,001 - 1,000,000	8.3	9.1	0.0	33.3	**9.4**	0.0	50.0	0.0	0.0	**16.7**
KSh >1,000,001	0.0	27.3	66.7	0.0	**21.9**	0.0	25.0	0.0	0.0	**8.3**
Total Number	**12.0**	**11.0**	**6.0**	**3.0**	**32.0**	**6.0**	**4.0**	**2.0**	**0.0**	**12.0**

5.11 Data Recovery

Data recovery is a process of salvaging inaccessible data from corrupted or damaged secondary storage, removable media or files, when the data they store cannot be accessed in a normal way. Online crime lead to data losses, in some instances however, the lost data is recoverable. The cost of recovering lost data becomes a burden to businesses as a significant amount of money and time are needed to have the data restored. Table 5.9 presents the proportion of enterprises by the cost of recovering data lost through online crime. Overall, 55.6 per cent of the enterprises spent less than KSh 10,000 in recovering data lost as a result of online crime. Most enterprises incurred costs of KSh 500,000 and below except for small enterprises that had 2.0 per cent of the enterprises reporting a cost of over one million Kenya shillings and large enterprises that had 16.7 per cent of the enterprise incurring costs of between KSh 500,000 and KSh 1,000,000.

Table 5.9: Cost of Data Recovery

Amount	Online Transactions				Total
	Enterprise Size				
	Micro	Small	Medium	Large	
< KSh 10,000	33.3	27.3	0.0	0.0	**55.6**
KSh 10,001 - 50,000	50.0	18.2	18.2	33.3	**28.2**
KSh 50,001 - 100,000	0.0	0.0	0.0	0.0	**7.7**
KSh 100,001 - 500,000	8.3	18.2	16.7	33.3	**6.8**
KSh 500,001 - 1,000,000	8.3	9.1	0.0	33.3	**0.9**
KSh >1,000,001	0.0	27.3	66.7	0.0	**0.9**
Total Number	**12.0**	**11.0**	**6.0**	**3.0**	**117**

5.12 ICT Expenditure

Spending on ICT in Africa is roughly in line with the global average, although there is a considerable variation between countries (World Bank and AFDB Report). In Kenya, Businesses have progressively been automating their processes with the aim of enhancing the quality of products as well as lessen the time taken to produce and deliver goods and services to the market. This has led to a considerable growth in the amount of resources used in the purchase of ICT related items. The survey sought to establish the amount of money businesses spent on acquisition of ICT items in 2015. Table 5.10 provides the proportion of the enterprises by ICT expenditure, size of the enterprise and industry.

Survey results show that most micro (41.3 per cent) and small (47.8 per cent) enterprises spent between KSh 100,000 and KSh 500,000 in purchasing ICT items in 2015. Almost half of the surveyed medium enterprises and slightly over two thirds of large enterprises spent in excess of one million Kenya shillings on ICT related expenditure. Further, slightly over a quarter (25.9 per cent) of the micro enterprises spent between KSh 10,000 and KSh 50,000 on ICT items.

Analysis by economic activity shows that most of the enterprises reported ICT expenditure of between the 100,000 and 500,000 Kenya shillings across all sectors. Exceptions were noted in the financial and insurance and agriculture, forestry and fishing sectors (horticulture only) where 42.7 per cent and 42.3 per cent, of the enterprises, respectively, reported spending over one million shillings on ICT.

Table 5.10: Total ICT Expenditure by Enterprise Size and Industry

Enterprise Size	< KSh 10,000	KSh 10,001 - 50,000	KSh 50,001 - 100,000	KSh 100,001 - 500,000	KSh 500,001 - 1,000,000	KSh >1,000,001
Micro	7.8	25.9	17.7	41.3	4.8	2.5
Small	1.5	7.8	10.4	47.8	14.7	17.8
Medium	0.4	3.8	4.6	24.6	17.5	49.1
Large	1.2	2.4	0.4	14.2	12.2	69.7
Total	3.7	13.5	11.3	38.8	11.2	21.5
Economic Activity						
Agriculture, forestry and fishing (horticulture only)	1.9	6.7	4.8	24.0	20.2	42.3
Mining and quarrying	0.0	0.0	0.0	50.0	0.0	50.0
Manufacturing	2.4	5.4	8.3	37.7	16.3	30
Electricity, gas, steam and air conditioning	0.0	13.3	20	33.3	6.7	26.7
Water supply; sewerage, waste management and remediation activities	11.1	0.0	55.6	11.1	0.0	22.2
Construction	3.6	17.9	17.9	45.6	7.7	7.2
Wholesale and retail trade; repair of motor vehicles and motorcycles	6.4	21.1	14.1	35.7	10.2	12.5
Transportation and storage	2.8	8.4	9.0	34.8	10.7	34.3
Accommodation and food service activities	0.4	9.9	12.6	42.6	12.6	22.0
Information and communication	0.8	5.3	3.8	40.6	11.3	38.3
Financial and insurance activities	3.1	10.4	6.3	28.1	9.4	42.7
Real estate activities	3.8	13.5	7.7	46.2	12.5	16.3
Professional, scientific and technical activities	1.6	9.1	13.5	49.6	9.1	17.1
Administrative and support service activities	2.0	14.3	5.4	48.3	9.5	20.4
Education	3.4	10.3	6.9	37.9	6.9	34.5
Human health and social work activities	6.1	21.2	12.1	30.3	6.1	24.2
Arts, entertainment and recreation	4.8	19.0	14.3	38.1	4.8	19.0
Other service activities	6.0	12.0	12.0	36.0	10.0	24.0
Total	**3.7**	**13.5**	**11.3**	**38.8**	**11.2**	**21.5**

5.13 ICT Waste Disposal

Access to Information and Communication Technology (ICT) is pivotal to Kenya's economic and social development. However, ICT contributes to the ever-growing amount of e-waste, when appliances reach their end of life, either through wear and tear or obsoleteness. E-waste has been acknowledged as a complex waste stream containing hazardous substances but also a valuable secondary resource. E-waste contains more than 1,000 different substances, many of which are toxic, such as lead, mercury, arsenic, cadmium, selenium, hexavalent chromium, and flame retardants that create dioxin emissions when burned.

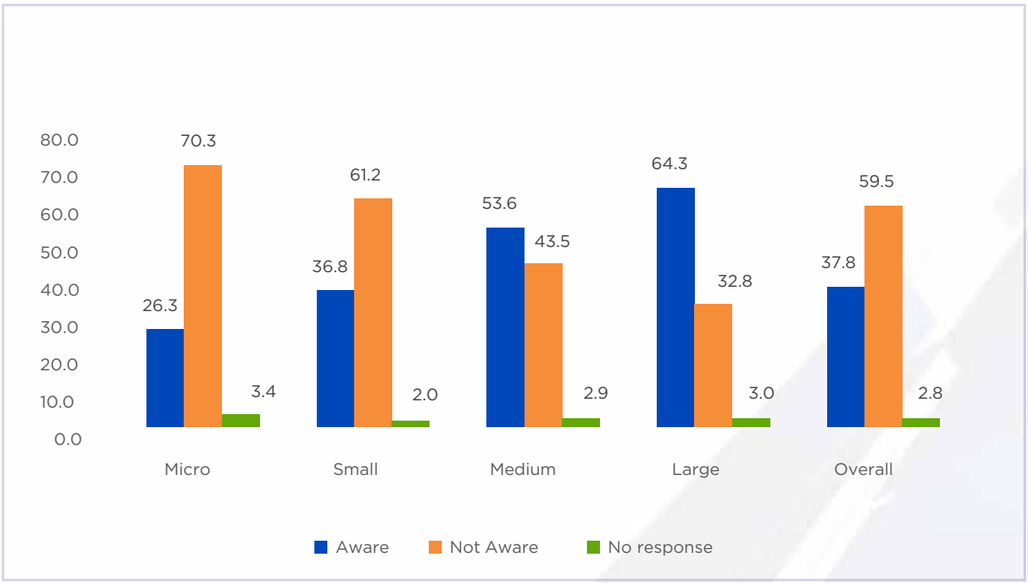
The United Nations Environmental Programme (UNEP) estimated annual e-waste generated in Kenya at 11,400 tonnes from refrigerators; 2,800 tonnes from TVs; 2,500 tonnes from personal computers; 500 tonnes from printers and 150 tonnes from mobile phones (Press Release UNEP, 2010). The study also found that consumers were likely to dispose of 1,210.4 tonnes in the second-hand market, 18.6 tonnes to recyclers while recyclers and refurbishers send 605.2 tonnes for disposal.

This section of the survey was designed to collect details on ICT waste management in Kenya and establish if businesses had the requisite policies for disposal of electronic waste.

5.14 Knowledge of Methods of Electronic Waste Disposal

About 4 in every 10 responding enterprises indicated that were aware of the appropriate waste disposal methods. On the other hand, 59.5 per cent were not aware while 2.8 per cent of the enterprises surveyed did not respond as shown in Figure 5.4. More than a half (64.3 per cent) of the large enterprises were aware of appropriate disposal methods compared to 26.3 per cent of surveyed micro enterprises.

Figure 5. 4: Proportion of Enterprises Aware of Waste Disposal Methods by Size



5.15 Electronic Waste Management Policy

The survey results shows that over a third (37.0 per cent) of the surveyed enterprises reported that they had electronic waste management policieswhile 60.9 per cent of them did not have policies. Details on the proportion of enterprises with an e-waste policy are shown in Table 5.11. Sizeable proportions of enterprises reported having an ICT waste disposal policy across most sectors of the economy.

Figure 5. 5: Proportion of Enterprises with an Electronic Waste Management Policy

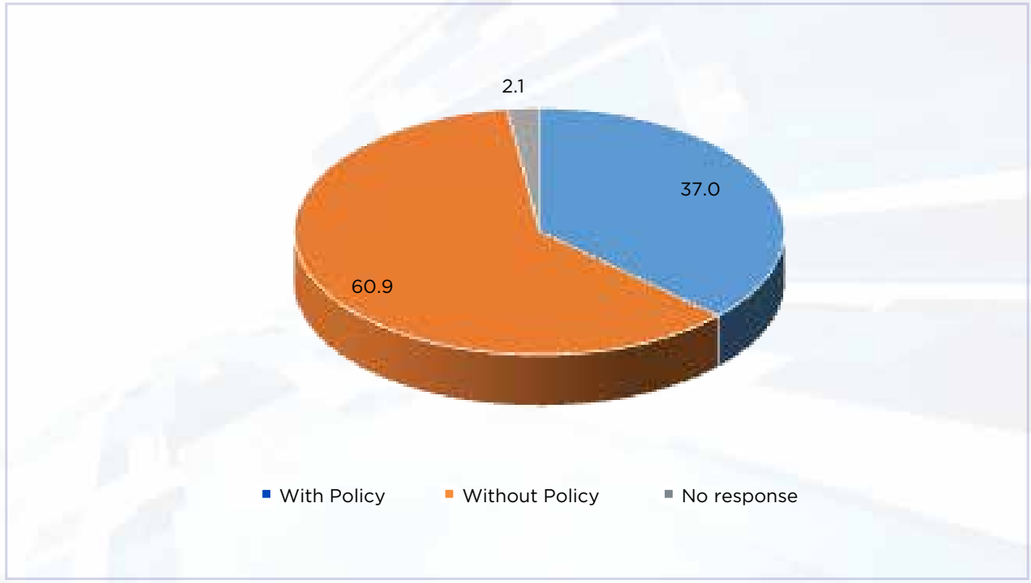


Table 5. 11: Proportion of Enterprises with a Waste Management Policy

Economic Activity	Micro	Small	Medium	Large	Total
Agriculture, forestry and fishing (horticulture only)	5.3	5.3	31.6	57.9	**32.2**
Mining and quarrying	33.3	0.0	33.3	33.3	**27.5**
Manufacturing	4.9	24.7	38.3	32.1	**16.7**
Electricity, gas, steam and air conditioning	0.0	50.0	50.0	0.0	**25.0**
Water supply; sewerage, waste management and remediation activities	0.0	0.0	0.0	100.0	**11.1**
Construction	27.3	45.5	22.7	4.5	**10.3**
Wholesale and retail trade; repair of motor vehicles and motorcycles	31.7	39.4	22.1	6.7	**8.7**
Transportation and storage	17.1	41.5	26.8	14.6	**20.2**
Accommodation and food service activities	6.3	34.4	46.9	12.5	**12.2**
Information and communication	29.4	33.3	29.4	7.8	**32.1**
Financial and insurance activities	21.4	42.9	21.4	14.3	**24.1**

Economic Activity	Micro	Small	Medium	Large	Total
Real estate activities	23.1	61.5	15.4	0.0	**9.7**
Professional, scientific and technical activities	45.3	41.5	11.3	1.9	**18.3**
Administrative and support service activities	40.0	28.0	20.0	12.0	**15.1**
Education	33.3	33.3	0.0	33.3	**9.1**
Human health and social work activities	25.0	37.5	12.5	25.0	**20.5**
Arts, entertainment and recreation	0.0	66.7	33.3	0.0	**11.5**
Other service activities	33.3	22.2	33.3	11.1	**14.3**
Total	**8.7**	**13.6**	**25.0**	**27.5**	**14.7**

5.16 Disposal of Unwanted/Obsolete ICT Equipment

Most micro enterprises mainly disposed of their telephone and accompanying cable wastes to the waste bins while small, medium and large enterprises mainly sold the waste in 2015 as shown in Table 5.12. Whereas all categories of enterprises sold their electronic waste, a considerable proportion of medium and large enterprises donated their ICT waste. Most of the electronic waste of storage equipment such as servers and routers and, printing and copying machines were sold while that of small storage devices such as CD and DVD were disposed of in waste bins.

Table 5. 12: ICT Disposal by Type of Equipment and Size of the Enterprise

ICT Equipment	Mode of disposal	Micro	Small	Medium	Large	Total
Telephone (include the cables for the phone) handsets etc	Sold	11.1	14.3	18.3	26.9	**14.8**
	Waste bin	14.9	14.1	14.4	13.8	**14.4**
	Sent for recycling	3.0	6.4	12.2	14.4	**6.7**
	Donations	9.5	11.7	12.6	12.5	**11.1**
Desktop computer and laptop, TV monitors	Sold	14.2	18.4	29.0	34.4	**19.8**
	Waste bin	5.9	5.8	5.9	7.2	**6.0**
	Sent for recycling	4.2	6.1	12.4	11.1	**6.8**
	Donations	11.1	16.7	20.7	25.6	**15.9**
Printers, photocopier and scanners and fax machines	Sold	12.0	16.1	25.2	29.8	**17.1**
	Waste bin	5.6	6.6	6.8	7.9	**6.4**
	Sent for recycling	4.2	6.9	11.0	11.5	**6.9**
	Donations	7.2	11.1	13.5	18.7	**10.6**
Servers routers, data storage equipment's	Sold	6.2	8.9	14.2	19.7	**9.6**
	Waste bin	6.4	7.4	9.4	10.5	**7.6**
	Sent for recycling	2.4	6.1	10.8	11.1	**5.9**
	Donations	3.8	6.4	7.4	6.6	**5.6**
CDs, DVDs, external hard drive, flash disks etc	Sold	4.0	5.7	7.0	9.8	**5.6**
	Waste bin	25.5	28.7	33.1	29.8	**28.2**
	Sent for recycling	3.1	5.8	9.2	12.8	**5.9**
	Donations	4.2	5.8	7.0	7.2	**5.5**

5.17 IT Capacity and Training

Survey findings portray a positive correlation between IT capacity building and the enterprise size, with the large firms having the highest proportion of both in-house and outsourced trainings. Table 5.13 presents details on businesses' training for the various type of needs. Enterprises relied more on outsourced training as opposed to in-house training. The highest proportion of businesses (27.8 per cent) reported in-house training on repair and maintenance of equipment. On the other hand, training on internal systems was reported by 14.1 per cent of the enterprises. Over half (54.4 per cent) of large enterprises reported to have conducted in-house training on equipment repair and maintenance compared with 39.5 per cent of micro enterprises who outsourced the same services.

Over one third (37.1 per cent) of the surveyed enterprises outsourced training on software development while 18.8 per cent of the enterprises outsourced training on the technical support for internal system of the organization. The results show that all the enterprises had built capacity in at least one of the categories.

Table 5. 13: Businesses IT Capacity Building by type of Training

Type of Training	Micro	Small	Medium	Large	Total
Repair and Maintenance					
In-house	15.8	28.1	41.7	54.4	**27.8**
Outsourced	39.5	45.2	48.7	45.9	**43.6**
No training	24.7	19.6	16.2	11.1	**20.3**
Internal System					
In house	8.1	13.8	21.6	28.2	**14.1**
Outsourced	17.1	19.9	20.0	18.7	**18.8**
No training	35.2	32.6	25.4	26.9	**32.0**
Software Development					
In-house	6.7	11.5	18.5	22.3	**11.7**
Outsourced	27.6	39.4	47.8	50.5	**37.1**
No training	30.9	27.4	20.0	22.3	**27.1**
Development of web portals, hosting providers and other information services on the Internet					
In-house	5.8	10.4	18.7	18.7	**10.7**
Outsourced	25.9	37.7	46.4	47.9	**35.4**
No training	32.8	28.1	20.7	22.3	**28.2**
Electrical Infrastructure, networks					
In-house	10.0	19.2	33.3	50.2	**20.5**
Outsourced	31.1	39.6	47.3	41.6	**37.7**
No training	28.1	23.8	16.2	14.8	**23.5**

Chapter 6

Perception of Enterprises on the Use of ICTs

Chapter 6. Perception of Enterprises on the Use of ICTs

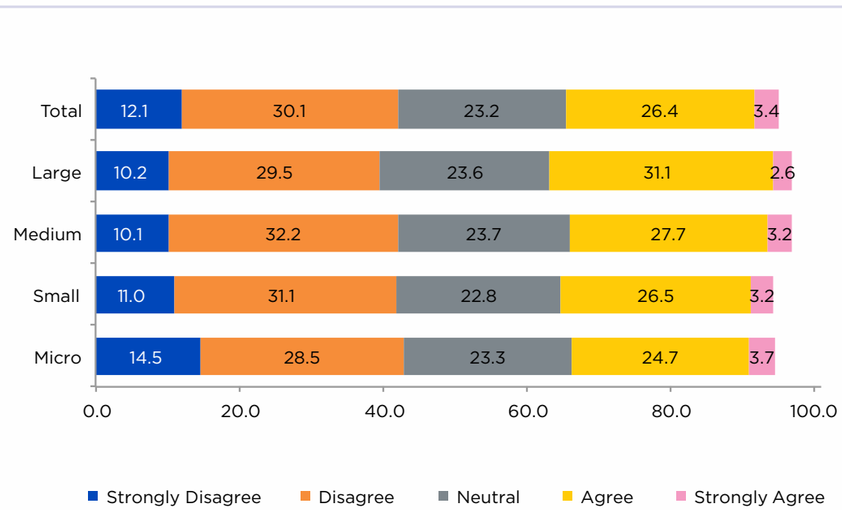
6.1 Introduction

The assessment of perceptions was deemed necessary to provide qualitative analysis of the enterprises perception on the use of ICTs, and the changes brought about as a result of developments in the ICT sector. The likert scale was applied to evaluate the opinions of enterprises on the use of various ICTs.

6.2 Perception on Costs of ICT Equipment

The possession of ICT equipment is important for enterprises to allow access to ICT services and ease business operations. The findings of the ICT survey 2016 indicate that most enterprises (42.2 per cent) did not think that ICT equipment were affordable compared to 29.8 per cent, who thought they were affordable as shown in Figure 6.1. Whereas the majority of enterprises reported that the equipment were affordable, the bigger the size of the enterprise, the higher the proportion of those who agreed with the statement

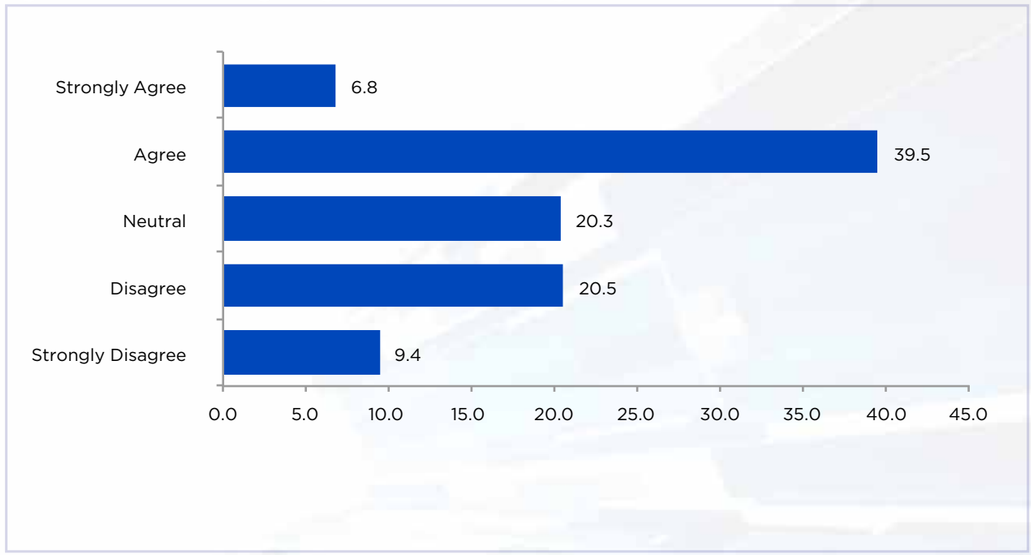
Figure 6. 1: Perception on Affordability of ICT Equipment



6.3 Perception on Calling Costs and Quality of Mobile Network

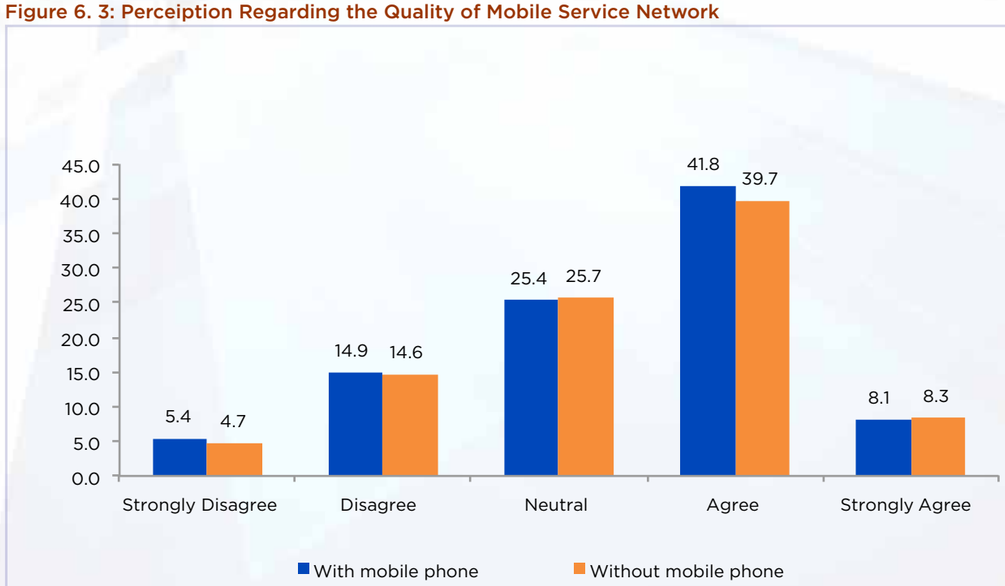
The Enterprise ICT 2016 survey sought to establish the perception of businesses on the costs of calling. The findings indicate that 39.5 per cent of institutions agreed that the cost of calling was affordable while 6.8 per cent strongly agreed. In general, overall perception is that calling costs are affordable as indicated by 46.3 per cent of enterprises that agreed compared with 29.9 per cent that disagreed with the statement as seen in Figure 6.2.

Figure 6. 2: Perception Regarding Affordability of Making Calls



The enterprises' perception on the reliability of service networks was also assessed. In general, most enterprises (49.9 per cent) of those with a mobile concur that mobile service network is good compared to 48.0 per cent of those without.

Figure 6. 3: Perceiption Regarding the Quality of Mobile Service Network



6.4 Perception on Internet Costs, Connectivity, and Ease of Doing Business

The survey sought to establish the general perception on the cost of Internet for the business. In total, 62.2 per cent of enterprises were of the opinion that Internet costs were high, compared to 12.6 per cent that disagreed as seen in Figure 6.4. A slightly higher proportion of enterprises with Internet connected to their premises (64.2 per cent) agreed that costs were high compared with those that did not have a connection (51.7 per cent). The reported view on the high cost of Internet shows minimal variance by enterprise size as shown in Figure 6.5.

Figure 6. 4: Perception Regarding Affordability of Internet

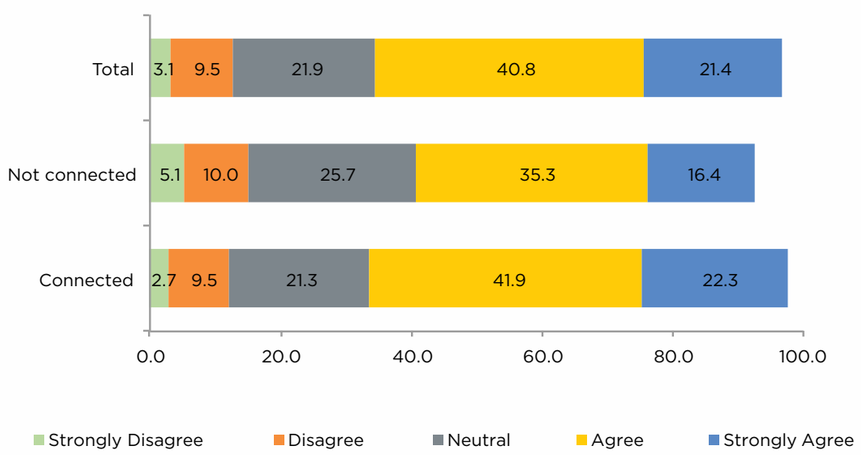
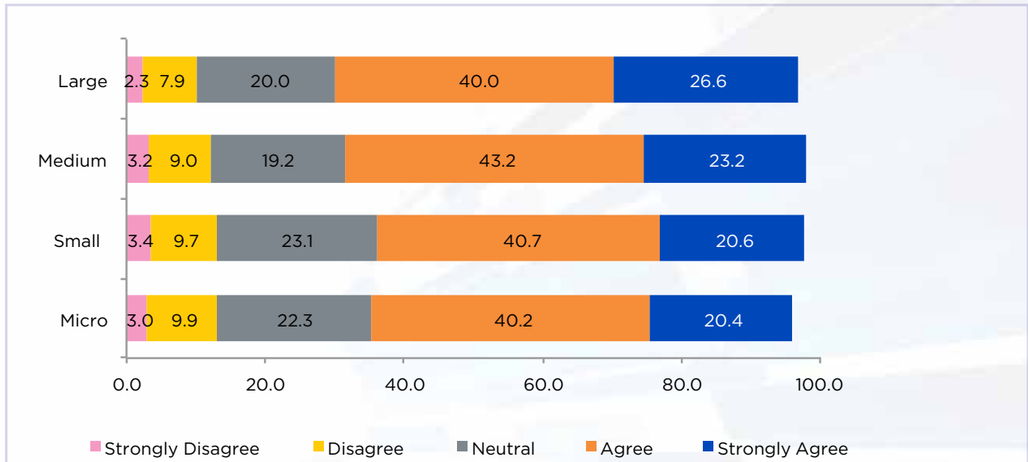


Figure 6. 5: Perception Regarding Affordability of Internet



A reliable Internet connection is important especially due to increased use of online facilities for e-commerce, client satisfaction feedback and enhancing work flow within enterprises. The survey sought to establish the opinion of enterprises on Internet connectivity, irrespective of the technology used. A comparison has been made between those that had Internet connected to the premises (connected) and those that did not have (not connected), as shown in Figure 6.6. In total, 42.6 per cent of the enterprises agreed that Internet connectivity was reliable; however, the majority of those connected agreed (44.5 per cent, compared to those that were not at 32.8 per cent. An overwhelmingly large proportion of enterprises reported that Internet connectivity had improved the ease of doing business; and was even higher among enterprises that had Internet connection to their premises (85.1 per cent), as shown in Figure 6.7.

Figure 6. 6: Perception Regarding Reliability of Internet Connectivity

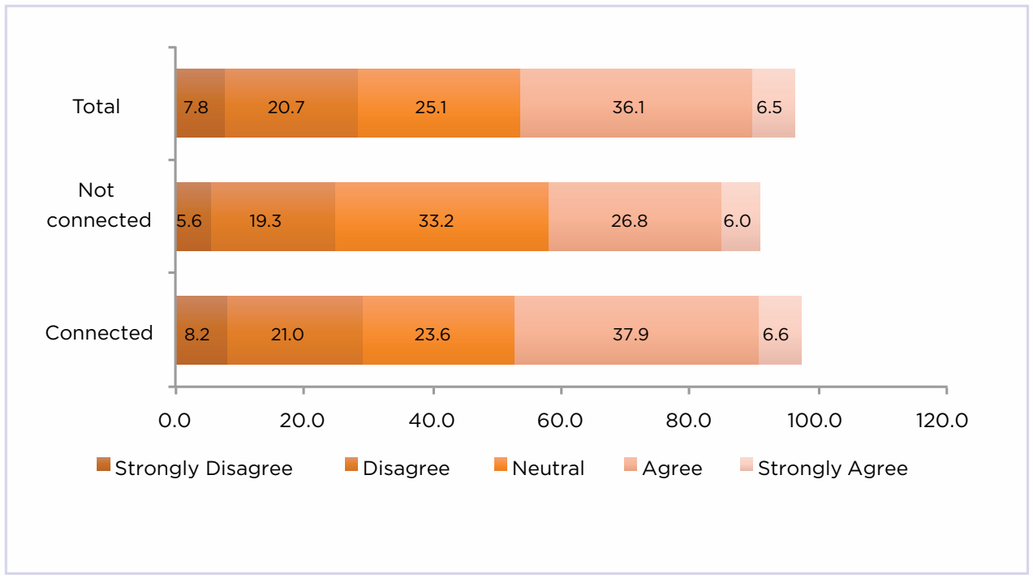
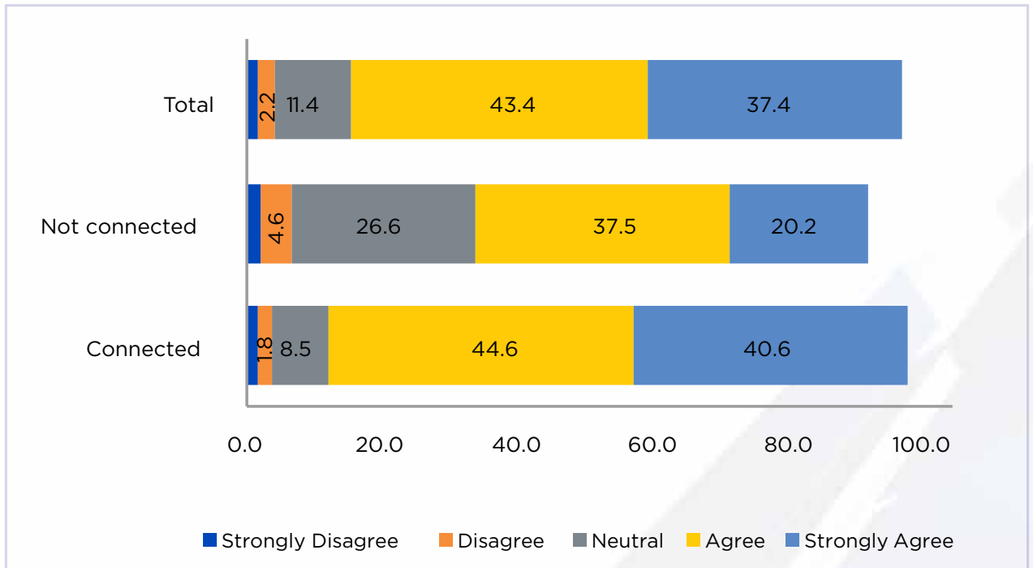


Figure 6. 7: Perception as to whether Internet Connectivity has Improved Ease of Doing Business



6.5 Perception on Mobile Money, Mobile Banking, Online Banking and E-commerce

The cost of mobile money transactions was reported to be high by 60.5 per cent of the enterprises as shown in Figure 6.8 as was the case with mobile banking costs as shown in Figure 6.9.

Figure 6. 8: Perception regarding the Cost of mobile money transactions being high

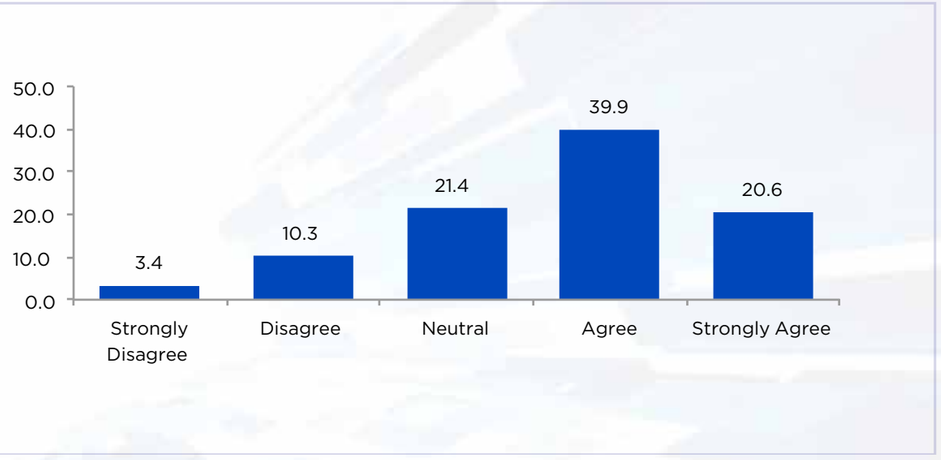
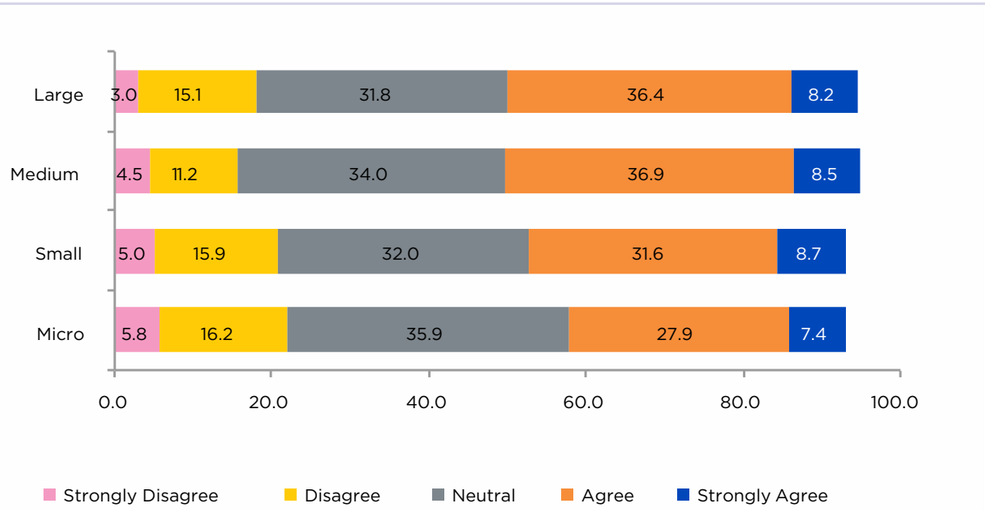


Figure 6. 9: Perception as to whether the cost of Mobile banking is high



Most enterprises across firm size agreed that transacting money online was safe as seen in Figure 6.10.

Figure 6. 10: Perception as to Whether Money is Safe while Transacting Online



The survey sought to establish enterprises' perception on the delivery of goods sold and purchased through online. In total, 35.3 per cent of enterprises reported that they believed that purchases made online would be delivered (Figure 6.11). This proportion of enterprises was higher among those that placed orders via online, of whom 48.8 per cent perceived that purchases would be delivered. However, timeliness of delivery of purchases made was reportedly low as shown in Figure 6.12.

Figure 6. 11: Perception Regarding Guarantee of Delivery of Goods Purchased Online

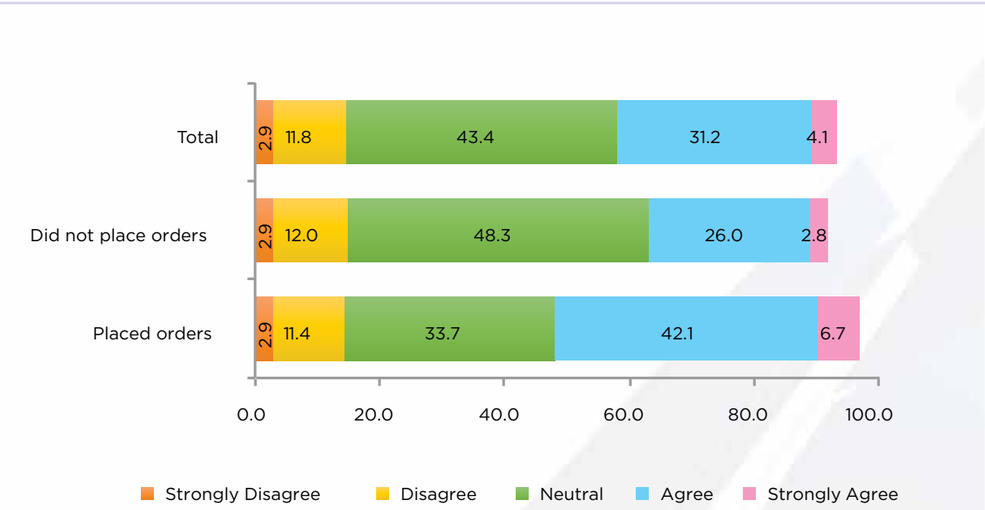
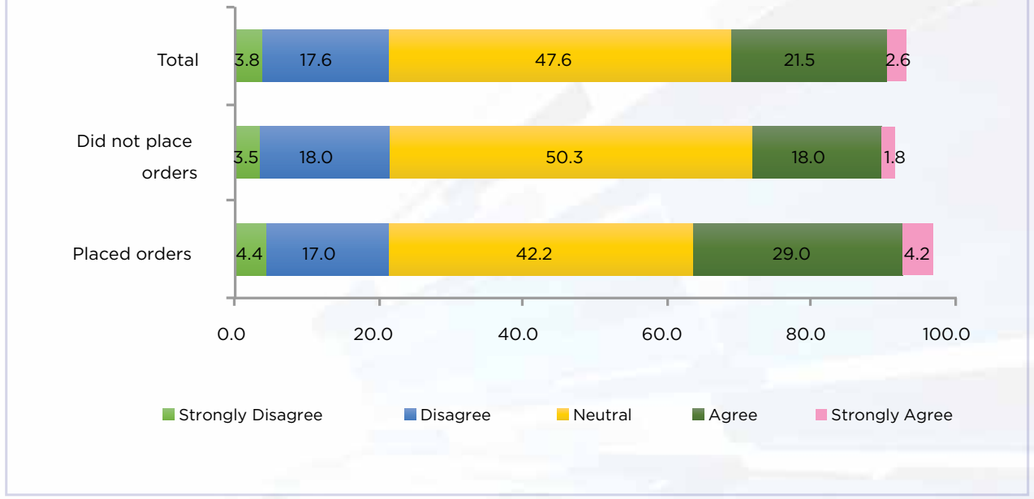


Figure 6. 12: Enterprises' Confidence that Goods Purchased Online would be Delivered on Time



About 26.5 per cent of enterprises had confidence that goods purchased online are as per expectations as seen in Figure 6.13 while 35.6 per cent had confidence that goods sold online will be delivered as seen in Figure 6.14.

Figure 6. 13: Enterprises' Confidence that Goods Purchased Online would meet their Expectations

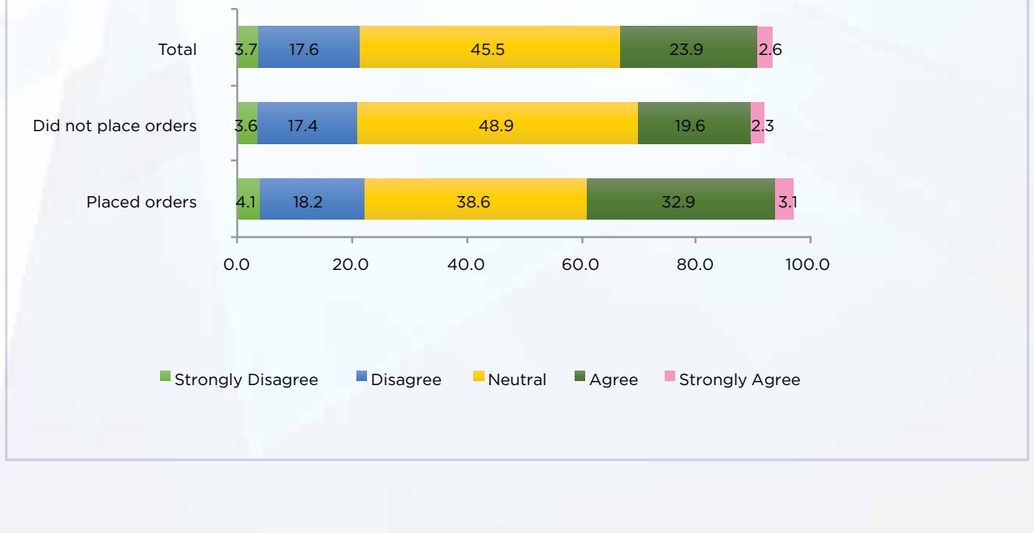
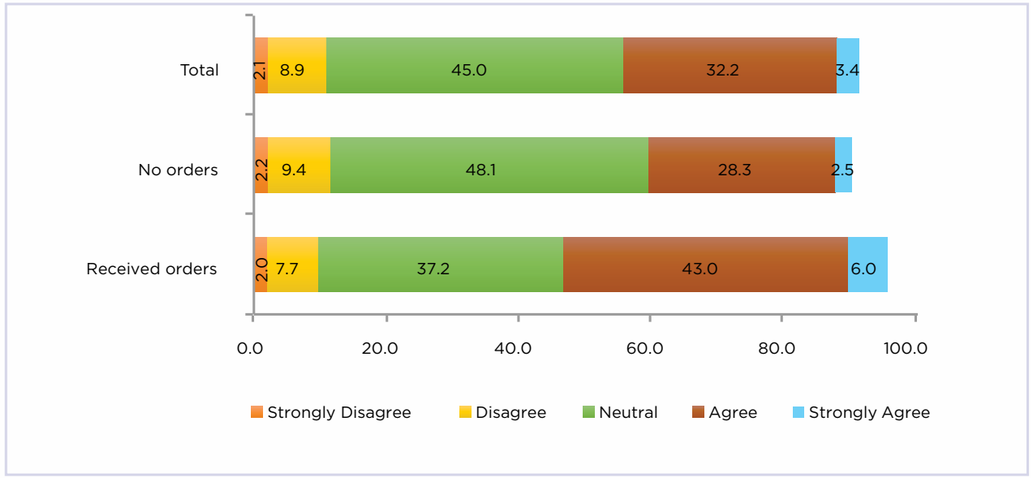


Figure 6. 14: Enterprises' Confidence that Goods sold Online would be Delivered





Chapter 7

Comparative Analysis

Chapter 7. Comparative Analysis

7.1 Comparison Between ICT Survey 2016 and CIP 2010

KNBS conducted Census of Industrial Production (CIP) in 2010 with the aim of providing comprehensive information on the structure of the industrial activities in Kenya. The main objective of the CIP was to collect data on characteristics and structure of enterprises engaged in industrial activities. The census, however, included some selected ICT indicators related to infrastructure and services for industries under Sections B (mining and quarrying), C (manufacturing), D (electricity, gas, steam, air conditioning supply), and E (water supply, sewerage, waste management and remediation activities) of the ISIC rev 4. On the other hand, the Enterprise ICT Survey 2016 collected more data that are comprehensive on the ICT indicators, which covered more sectors than the CIP 2010. Comparison of indicators between Enterprise ICT Survey 2016 and CIP 2010 was therefore only possible for the selected indicators in the corresponding industries. It was deemed necessary to compare the results of the two surveys to evaluate progress on the uptake of ICT by enterprises between the two periods. An analysis of the indicators shows notable growth in the adoption of technologies by the industrial sector in terms of access to and use of ICT. Over the 6-year period, there have been significant changes in the adoption of Internet and computers in the industrial environment. Table 7.1 presents a comparative analysis of ICT Survey 2016 and CIP 2010.

According to the ICT survey 2016, 97.1 per cent of the sampled enterprises were found to be using computers in 2015 compared to 46.7 per cent as reported in CIP 2010. The use of Internet stood at 92.9 per cent as at December 2015 compared to 50.6 per cent reported in 2010. The proportion of enterprises with a website almost doubled from 28.6 per cent in 2010 to 55.5 per cent in 2015, while that of enterprises with Internet increased fourfold from 10.3 per cent to 46.4 per cent over the same period. The Enterprise ICT Survey 2016 reveals a notable growth in the purchase and sale of goods and services via email with 80.8 per cent of the enterprises using email to place orders in 2015 compared to 45.7 per cent in 2010.

Table 7. 1: Comparative Analysis of ICT Survey 2016 and CIP 2010

Core Indicators	ICT survey 2016	CIP 2010
	Per Cent	
B1: Proportion of enterprises using computers	97.1	46.7
B3: Proportion of enterprises using the Internet	92.9	50.6
B5: Proportion of enterprises with a website	55.5	28.6
B6: Proportion of enterprises with an intranet	46.4	10.3
B9: Proportion of enterprises using the Internet by type of access		
Fixed Broadband	68.5	34.6
Mobile broadband	34.1	25.9
B10: Proportion of enterprises with a local area network (LAN)	70.1	62.4
B11: Proportion of enterprises with an extranet	19.3	9.8
Country Specific Indicators		
Proportion of enterprises with mobile phone	90.2	71.2
Proportion of enterprises with fixed telephone	57.6	71.3
Proportion of enterprises receiving orders via email	78.8	45.5
Proportion of enterprises placing orders via email	80.8	45.7

7.2 Comparative Analysis of Public Institutions and Enterprises

The ICT Survey 2016 captured data on access and usage of ICTs in both public institutions and enterprises in Kenya. This chapter presents a comparison of public institutions and enterprise indicators as shown in Table 7.1. According to the survey, there was high mobile phone use in enterprises at 85.7 per cent compared to 65.8 per cent in public institutions. This could be explained by the practise of enterprises providing their employees with mobile handsets and lines to facilitate work. Majority of public institutions (85.6 per cent) and enterprises (87.7 per cent) had official email addresses. Over 60.0 per cent of the public institutions and enterprises had Local Area Network (LAN).

The results of the surveys reveal that a high proportion of public institutions and enterprises had high Internet connectivity at 80.2 per cent and 84.2 per cent, respectively. Those accessing Internet elsewhere was high at 17.8 per cent and 9.1 per cent in public institutions and enterprises, respectively. The most popular forms of Internet connectivity were mobile Internet via modems at 47.0 per cent and 26.2 per cent in public institutions and enterprises, respectively. Fixed Internet through fiber to the office was found in 55.8 per cent and 50.7 per cent of public institutions and enterprises, respectively. Mobile Internet through phones was reported by 23.5 per cent of public institutions and 17.6 per cent of the surveyed enterprises.

Over half (57.5 per cent) of public institutions and 50.3 per cent of the enterprises reported to have established websites. Locally hosted websites were reported at 83.6 per cent for public institutions and 60.9 per cent for enterprises. The main reasons for international web hosting was reliability at 76.0 per cent and 56.8 per cent for institutions and enterprises, respectively. Security reasons were cited by 60.0 per cent and 38.1 per cent of public institutions and enterprises, respectively

The survey results show that, about a half (48.1 per cent) of public institutions had IT policies in place to guide the usage and management of the IT resources. On the other hand, a smaller proportion of enterprises (37.0 per cent) had IT policies in place. Further, the survey established that the use of cloud computing as a way of delivering information technology services was still very low in institutions (35.8 per cent) and enterprises (22.9 per cent). Similarly, the proportion of institutions and enterprises that had ICT security policies was low at 43.4 per cent and 36.6 per cent, respectively.

A higher proportion of public institutions (46.4 per cent) reported to have experienced computer virus attacks compared to enterprises (21.7 per cent). Other forms of online crimes experienced included hacking at 7.3 per cent and 5.5 per cent for institutions and enterprises, respectively

The results of ICT Survey 2016 indicate that despite the existence of the National Kenya Computer Incident Response Team Coordination Centre (National KI-CERT/CC), a considerable proportion of public institutions (39.7 per cent) and enterprises (46.3per cent) did not report online crime to the centre. This implies inadequate awareness by both public institutions and enterprises on the role of National KI-CERT/CC. Online crimes were mainly reported to ICT Authority, Kenya Police Service and Communications Authority of Kenya.

Table 7. 2: Comparative Analysis of Public Institutions and Enterprises

Indicators	Public Institutions	Enterprises
	Per Cent	
Proportion of enterprises/institutions with mobile phone	65.8	85.7
Proportion of enterprises/institutions with fixed telephone	49.2	50.5
Proportion of enterprises/institutions with facsimile machine	21.6	11.3
Proportion of enterprises/institutions with mobile payment account	20.7	72.7
Proportion of enterprises/institutions with Internet in their premises	80.2	84.2
Proportion of enterprises/institutions with Internet in their premises by type of Internet connectivity		
Fixed Internet - Cable modem	23.7	18.9
Fixed Internet - Copper line (dial-up, DSL and xDSL)	6.3	4.1
Fixed Internet - Fiber to the office	55.8	50.7
Fixed Internet - Satellite	6.6	6.2
Fixed Internet - Fixed wireless e.g. Wi-Max	44.0	40.5
Mobile Internet - Phones	23.5	17.6
Mobile Internet - Modems	47.0	26.2
Proportion of enterprises/institutions with accessing Internet elsewhere	17.8	9.1
Proportion of enterprises/institutions with LAN	63.7	60.4
Proportion of enterprises/institutions with Intranet	36.3	39.6
Proportion of enterprises/institutions using specialised applications for human resource	56.5	27.1
Proportion of enterprises/institutions with official email address	85.6	87.7
Proportion of enterprises/institutions with website	57.5	50.3
Proportion of enterprises/institutions hosting website locally	83.6	60.9
Proportion of enterprises/institutions hosting website internationally	15.0	36.7
Proportion of enterprises/institutions hosting website internationally, by type of reason		
Cost	41.6	35.0
Security	58.4	38.1
Technical know how	27.3	27.5
Reliability	72.7	56.8
Institution's policy	7.8	32.0

Table 7. 2: Comparative Analysis of Public Institutions and Enterprises

Indicators	Public Institutions	Enterprises
	Per Cent	
Proportion of enterprises/institutions using Cloud computing	35.8	22.9
Proportion of enterprises/institutions with information technology policy	48.1	37.0
Proportion of enterprises/institutions with ICT security Policy	43.4	35.9
Proportion of enterprises/institutions aware of National KE-CIRT/CC	26.9	14.6
Proportion of enterprises/institutions experienced Online crime, by type		
Hacking	7.1	5.1
Phishing	4.4	3.3
Theft of money (online)	0.3	0.7
Theft of information (online)	2.0	1.1
Identity theft	2.2	0.8
Website vandalism	3.7	1.5
Computer virus	44.8	20.3
Proportion of enterprises/institutions who reported online crime by type of organisation		
Kenya Police Service	14.0	25.9
Communications Authority of Kenya	3.7	4.6
ICT Authority	27.9	15.3
National Kenya Computer Incident Response Team- Coordination Centre	0.0	1.4
Central Bank of Kenya	1.5	1.4
Engaged IT Consultant	0.0	6.9
Did Not Report	39.7	46.3
Internet Service Provider (ISP)	0.0	3.7
Reported internally	17.6	0.0
Proportion of enterprises/institutions with E-waste management policy	34.1	37.0

Annex

Annex 1: Concepts and Definitions

Skilled Workers: This includes paid employees, working owners/operators, unpaid family workers (contributing family workers) or apprentice who have served an apprenticeship, practice the trade learned or similar activity, and by reason of their knowledge and vocational capacity are given tasks which are particularly difficult, involving varied responsibilities or fields. They include those who are paid or not paid.

Semi-skilled workers: This includes paid employees, working owners/operators, unpaid family workers (contributing family workers) or apprentice. These are workers who can only perform their job after a period of instructions of several months in general and are given tasks – mostly specific to the industry – which are regularly repeated, are less difficult and involve less responsibility.

Unskilled, Unqualified Workers: This includes paid employees, working owners/operators, unpaid family workers (contributing family workers) or apprentice. These are workers who require no specific vocational training or only brief initiation and work on auxiliary tasks.

Application Hosting: A hosted application is a Software as a Service (SaaS) solution that allows users to execute and operate a software application entirely from the cloud on a recurring subscription. Hosted applications are hosted and powered from the remote cloud infrastructure and are accessed globally through the Internet.

Email and messaging: Email is a service of sending quick mails. The Internet is used to transport mail. In this network, each server at regular intervals calls another server, often using a modem, so that they exchange letters. A mail server responds to requests for routing email. The server stores the received messages, and sends outbound messages to the recipient (another mail server). A mail server also responds to requests for manipulation and retrieval of stored messages,

Customer Relationship Management (CRM): This is where the CRM management software, CRM tools and organisations customer data resides in the cloud and is delivered to end users via the Internet. Cloud CRM typically offers access to the application via Web-based tools (or Web browser) logins where the CRM system administrator has previously defined access levels across the organization. Employees can log in to the CRM system, simultaneously, from any Internet-enabled computer or device. Often, cloud CRM provide users with mobile apps to make it easier to use the CRM on smartphones and tablets.

Server capacity: Corresponds to the total volume of digital data that can be stored therein. For example, the total storage capacity of a cinema server or a centralized library server (which is expressed in terabytes).

Application development: This is developing applications while using the application program that are not entirely residing in the desktop. They are more of web app that are entirely stored on a remote server and is delivered over the Internet through a browser interface.

Business specific: Applications that are used as a delivery mechanism for providing specific goods or services to customers.

Finance and enterprise resource planning: Offered through Software as a Service (SaaS), the finance and enterprise resource planning is offered through cloud rather than proprietary server infrastructure to help companies share information across departments. Cloud ERP software integrates some or all of the essential functions for running a business, e.g. accounting, inventory and order management, human resources, customer relationship management (CRM), etc. - into one complete system.

Desktop/office software: Offers users to access and manage the contents through cloud rather than on the desktop as is in the ordinary way

Content management system/ Document management system: Enables users to access their files such as content library, records of changes to each document and audit trails etc. at any time at any device. These systems are mainly house in based depending on the need of each enterprise.

Business Intelligence: Business intelligence is the process of gathering data to convert it into meaningful information using software, tools and methodologies. This in turn aids the decision making of any organization. Business intelligence systems help with activities ranging from discovering-mapping-extracting of data to transforming-modelling-validating the information.

Business process manager (BPM) on cloud: This is the use of (BPM) tools that are delivered as software services (SaaS) over a network. Cloud BPM business logic is deployed on an application server and the business data resides in cloud storage. Business process management enables organizations to be more efficient, more effective and more capable of change than a functionally focused, traditional hierarchical management approach.

Enterprise Service Bus: This is an integrated platform that provides fundamental interaction and communication services for complex software applications via an event driven and standards-based messaging engine, or bus, built with middleware infrastructure product technologies. The ESB platform is geared toward isolating the link between a service and transport channel and is used to fulfil Service-Oriented Architecture (SOA) requirements. The Enterprise Service Bus (ESB) is a middleware computer technology. Its purpose is primarily to allow communication applications that were not designed to work together.

More flexibility: A cloud service tailored precisely to customer needs can be seamlessly integrated into the existing IT infrastructure – without installing additional programs, adding new hardware or gobbling up huge amounts of storage space. Once you have registered with the service provider over the Internet, you simply log on and begin using the cloud solution. Not only does this cut costs, it also accelerates the implementation of new systems – significantly streamlining your processes. And because you are not dependent on local hardware or software, you gain a whole new level of flexibility in terms of accessing the solution. Cloud applications are available around the clock; all you need is an Internet connection. So you can work whenever and wherever you like – remotely, from home, or on the move. Cloud-based services are ideal for businesses with growing or fluctuating bandwidth demands. If your need increases it is easy to scale up your cloud capacity, drawing on the service's remote servers.

Cost savings: Saves cost e.g. server costs. An enterprise does not need to invest heavily on server(s).

Better scalability: Cloud solutions are infinitely scalable, meaning you can access the resources you need in line with your changing requirements. Usage-based pricing models ensure that you only pay for the services you actually use and this cost transparency gives you a reliable basis for planning. Cloud computing minimizes the risks associated with capital expenditure and the cost and effort of in-house operation and maintenance. You gain access to high-performance resources and professional solutions without needing to make upfront investment and by reducing the need for local resources; the cloud reduces expenditure in the long term. Therefore, cloud computing allows your business to easily upscale or downscale your IT requirements as and when required.

Complexity reduction (Simplicity): Anyone can use cloud computing as long as they are connected to Internet. Minimal skills are needed to use major cloud services.

More (Core) business focus: At times referred to as "Cloudonomics" or "economics of cloud computing". Refers to allowing a business or enterprise to focus on their core business and invest minimal in IT infrastructure.

Collaboration: Cloud collaboration is a type of enterprise collaboration that allows employees to work together on documents and other data types, which are stored off-premises and outside of the company firewall. Employees use a cloud-based collaboration platform to share, edit and work together on projects. Cloud collaboration enables two or more people to work on a project at once. A cloud collaboration project begins when one user creates the file or document and then gives access to certain individuals; for example, the project creator may share a link to the project that allows others to view and edit it. Users can make changes to the document at any time, including when employees are viewing and working simultaneously. All changes are saved and synced so every user sees the same version of the project.

Automatic Software updates: In cloud computing the servers are off-premises. Suppliers take care of them for you and roll out regular software updates – including security updates – so you do not have to worry about wasting time maintaining the system yourself. This leaves you free to focus on the things that matter, like growing your business.

Improved security: Lost laptops are a billion-dollar business problem. And potentially greater than the loss of an expensive piece of kit is the loss of the sensitive data inside it. Cloud computing gives you greater security when this happens. Because your data is stored in the cloud, you can access it no matter what happens to your machine. And you can even remotely wipe data from lost laptops so it does not get into the wrong hands.

Disaster Recovery: Businesses of all sizes should be investing in robust disaster recovery, but for smaller businesses that lack the required cash and expertise; this is often more an ideal than the reality. Cloud therefore offers small businesses to recover their data, reduce time, and avoid large up-front investment.

Dedicated Facsimile (fax): A facsimile (fax) machine uses public switched telephone networks (PSTN) and the Internet for the electronic fax transmission of text and images. Also referred to as telecopying or telefax, is the telephonic transmission of scanned printed material (both text and images), normally to a telephone number connected to a printer or another output device.

Dedicated mobile phone: It refers to a mobile phone owned by the business. A mobile phone may also include smart phones but excludes tablet, phablets etc.

LAN connection: A LAN refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless.

Narrowband refers to analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.

Fixed broadband refers to technologies such as DSL (Digital Subscriber Line) at speeds of at least 256kbit/s, cable modem, high speed leased lines, fibre-to-the-home, power line, satellite, fixed wireless, Wireless Local Area Network and WiMAX.

Cable modem: Is a type of modem that connects a computer or local network to broadband Internet service.

Copper line (dial up and DSL and xDSL): Is used to transmit digital data over telephone lines. The DSL services can be delivered simultaneously with wired telephone service on the same telephone line. xDSL refers collectively to all types of digital subscriber lines that is: Asymmetric Digital Subscriber Line (ADSL), Symmetric Digital Subscriber Line (SDSL), High data rate digital subscriber line (HDSL) and Very high DSL (VDSL). Everything operate over existing copper telephone lines. xDSL offers high speeds of up to 32 mbps for upstream traffic and from 32 kbps to over 1 mbps for down streaming traffic.

Fibre to the office: refers to technology associated with the transmission of information as light impulses along a glass or plastic wire or fibre. Fibre optic wire carries much more information than conventional copper wire and is far less subject to electromagnetic interference. The advantaged of fibre optic are they have much greater bandwidth than metal cables, are thinner and lighter than metal wires, data is transmitted digitally (the natural form of computer data) rather than analogically. Used to connect building to building.

Satellite: Is an artificial object, which has been intentionally placed into orbit. Such objects are sometimes called artificial satellites to distinguish them from natural satellites such as Earth's Moon.

Fixed wireless: Is the operation of wireless devices or systems used to connect two fixed locations (e.g., building to building or tower to building) with a radio or other wireless link, such as Laser Bridge. Usually, fixed wireless is part of a wireless LAN infrastructure. Fixed wireless devices usually derive their electrical power from the utility mains, unlike mobile wireless or portable wireless, which tend to be battery-powered. They include e.g. WiMAX, Wi-Fi,

Mobile broadband: Refers to access services include Wideband CDMA (W-CDMA), known as Universal Mobile Telecommunications System (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 2000 1xEVDV. Access can be via any device (mobile cellular phone, laptop, PDA, etc.)

Intranet: An intranet refers to an internal communications network using Internet protocols and allowing communication within an organization (and to other authorized persons). It is typically set up behind a firewall to control access.

Operating System: Is a system software that manages computer hardware and software resources and provides common services for computer programmes. The respondent should estimate the number of operating systems the business uses.

Internet Banking: Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account

Accessing other financial services: Includes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.

Staff training: Includes e-learning applications available on an intranet or from the WWW.

Telephoning over the Internet/ VoIP including video conferencing VoIP: Using Skype, iTalk, etc. Includes video calls (via webcam)

Tracking of goods and services: Tracking of goods delivered by DHL, EMS, TNT, G4S, Well Fargo courier services etc.

Internal or external recruitment: Includes having details of vacant positions on an intranet or website.

Delivering products on line: Refers to products delivered over the Internet in digitized form, e.g. reports, software, music, videos, computer games; and on-line services, such as computer-related services, information services, travel bookings or financial services.

Providing customer services: Includes providing online or emailed product catalogues or price lists, product specification or configuration online, after-sales support, and order tracking online

Advertising: Posting advertisements via social media, web pages for other companies such as newspaper

Research: Seeking informative information via Internet.

E-commerce: Is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or offline.

Phishing: Is the attempt to acquire sensitive information such as passwords, usernames, credit card for malicious reasons, by masquerading as a trustworthy entity via computer, phone etc.

Firewall: Software or hardware that controls access into and out of a network or computer.

Spam filter: Software that diverts incoming spam (junk e-mail). Spam filters trap messages using various criteria such as e-mail addresses or specific words (or word patterns) in the email.

Hacking/ theft of information: The practice of accessing computer networks illegally and stealing information without the user's knowledge or permission by using exploits. Hacking can also be done on phones, where one intercepts telephone calls or voicemail messages without consent of the phones owner. In a hack, information is extracted involuntarily, forcing the perpetrator to first take over your computer system, through brutal force or more sophisticated methods, to access the sensitive data.

Theft of money (online): Though this may be part of phishing, it is important to capture it separately. This entails theft of money via stealing credit/debit card information, stealing password for Internet banking, etc.

Identity theft: Same as phishing but differs depending where it is used. For example, in Facebook, one can sign up and pretend to be someone else and trick victim maliciously.

Website vandalism: It includes destroying, changing or defacing other's website content, whether it is a private or government website. Website vandals are usually software or high tech gurus involved.

Computer virus: A virus is a small piece of software that piggybacks on real programs. For example, a virus might attach itself to a program such as a spreadsheet program. Each time the spreadsheet program runs, the virus runs too.

Kenya National Bureau of Statistics
P.O. Box 30266, Nairobi 00100
Tel: +254-20-3317583 /3317612 /3317623
Hotline Numbers: 0701244533, 0735004401
Fax:+254-20-315977
E-mail: directorgeneral@knbs.or.ke, Website: www.knbs.or.ke
Kenya Stats @KNBStats

Communications Authority of Kenya
P. O. Box 14448, Nairobi 00800
Tel: +254 (0) 20 4242000, +254 703 042000
Fax: +254 (0) 20 4348135
E-mail: info@ca.go.ke, Website: www.ca.go.ke
Communications Authority of Kenya @ca_kenya