MALLL DESIGN™

SMART RETAIL TECHNOLOGY

SMART SPECS

INDEX

1. EXECUTIVE SUMMARY

1.1) Mission

i. MALLL Design (pty) ltd is a Retail & Technology Company focused on improving the Retail & Leisure Customers Entertainment Experience through integrating Technology into everyday living experiences.

1.2) Vision

i. MALLL Design aims to enhance Leisure & Travelling Experience through the seamless integration of Technology into everyday Leisure and Travelling Assets.
ii. MALLL Designs initial technology offering are SMART SPECS AR Glasses which provide an exceptional digital reality experience, utilizing binocular micro-LED displays. With the ability to explore virtual worlds, play games, and interact with digital content, the experience feels incredibly realistic.

1.3) Customer Market

Minimum Viable Segment

1) In-Travel Entertainment Segment (ITE)

i. TRAVEL CUSTOMERS
ii. IN-FLIGHT ENTERTAINMENT

a) AIRLINE PASSENGERS
b) AIRLINE CREW
c) AIRPORT RETAIL CUSTOMERS

iii. IN-TRANSIT ENTERTAINMENT

a) IN-TRANSIT PASSENGERS
b) IN-TRANSIT CREW
c) TRAIN-STATION RETAIL CUSTOMER
d) BUS-STATION RETAIL CUSTOMER

i. "Airlines have been working to improve in-flight entertainment options for years, with Skift Research stating in a 2014 report that it was an important factor for airlines to compete. Airlines are looking to beef up the options they provide, and sector that's expected to grow from being worth close to $6 billion in 2022 to roughly $14.5 billion by 2033" (Skift , 2023)

1.4) Operation

During a Transportation trip, the Transportation Travelling Experience accommodates for a Modern Customer who has several smart devices, a Modern Customer that prefers to engage with an online community, a digital community and digital productivity activities for the entire length of the Transport Travelling Experience.

This entails:

i. Internet Access as the Transportation moves through different regions with different “MASTS” infrastructure,
ii. Power Supply to ensure Smart Devices are charged throughout the Transportation Travelling Experience
iii. Unified & Streamlined (Compact) Digital Interfacing as there is limited space between seats and customers to accommodate for multiple smart devices
iv. Privacy of Digital Interfaces as there is limited space between seats and customers to accommodate for different Digital Activities one engages with both personally and professionally
v. Security of Smart Devices from Theft and Intimidation as devices are covert/ghost devices
vi. Personalisation of preference through AI Applications
vii. SMART SPECS are Technology integrated wearable Sun Glasses which gives the customers wearing the Glasses an Immersive Experience of 201"inch Screen, Spatial 3D Applications, Immersive Spatial Sound and an Interactive Voice to Visual AI Assistant.
viii. SMART SPECS connect to any compatible device through USB-Type C enabling an Enhanced Digital Experience of Electronic Devices into the Real World. This Digital Overlay into the Real World creates a better Communication & Information transfer experience, improving our knowledge and how we interact with the Real world

SMART SPECS TRAVEL CONFIGURATION

1. SPECS FULL SET (BUS – TRAIN – AIRPLANE)
i. TCL SMART SPECS
ii. APPLE MOBILE DEVICE
iii. MAGLEV CHARGER
iv. POWER SUPPLY CABLE & SOLID STATE BATTERY
v. CASING SOTHERING FOR UNIFIED CABLING & BOX

2. SPECS ONLY (TRAVEL RETAIL)
i. TCL SMART SPECS
ii. USB TYPE-C ADAPTER

1.5) Go To Market Strategy

i. Retail Distribution

a. We ensure SMART SPECS have shelve priority in all Clothing & Electronics Retail outlets throughout South Africa & Africa. Giving Consumers Access.

ii. Artist Endorsement

a. We collaborate with the Biggest and Best Artists from genres such as AmaPiano, House, Afrobeats, RnB and Hip Hop. This gives us a wide customer audience reach throughout South Africa & Africa.

iii. Influencer Endorsement

a. We collaborate with influential Social Media Personalities in the Arts, Beauty, Food & Fashion Industries for an even wider audience reach in South Africa & Africa.

iv. Curated Content

a. We have a dedicated Photography & Cinematography Team who ensure we produce & release Quality and engaging Content for Consumers to understand and purchase SMART SPECS.

1.6) Competition & Opportunity

i. "Smart glasses and augmented or mixed reality head-mounted displays (HMDs) are wearable electronic devices that interface between humans and computing through various forms of a heads-up display. Smart glasses typically have multiple features to allow users to both display and analyze information relevant to their surroundings. With augmented or mixed reality, digital projections are overlaid onto real life objects, providing contextual information and allowing users to visually manipulate their surroundings. Today, augmented reality is possible through smartphones, tablets, and a host of other mediums; this paper will focus specifically on head-mounted displays and their impact on supply chains. Today's devices are less intrusive, more ergonomic, and faster than their predecessors." (DELOITTE, 2018)

ii. "The metaverse can simply be defined as a virtual three-dimensional world that permits users to do everything they'd expect from the physical world. At a global level, companies like Meta, Microsoft, Apple, Alibaba, Baidu, Tencent and Google remain committed to the metaverse but they are showing more restraint in terms of their strategy, investment priorities and how they position the metaverse as a commercial proposition. There is solid engagement with the concept of the metaverse in South Africa, with a survey by cybersecurity company Kaspersky finding that 61.3% of workers in South Africa believe the metaverse will transformative for industries. Many companies involved with metaverse projects, with 69.6% of respondents stating that their companies are planning or actively working on them. In late 2022, Meta launched its #FlexNaija mixed reality event in Nigeria, marking its first metaverse related entry to Africa. The event showcased the possibilities of engaging with and utilizing mixed reality to over 300 Nigerian creators in Lagos, Attendees could view an NFT gallery and engage with augmented reality (AR) filters to avatar creation, Artists Teni, Santi and Ayra Starr performed at the event and people were able to watch and interact with the performances in the metaverse. To support the development of the metaverse, increasingly powerful cloud capabilities along with high-speed, low latency fifth-generation technology (5G) networks will need to be available in African markets to improve the user experience and encourage consumer and enterprise adoption, Edge architecture will also play an important role, improving efficiency and reliability for low latency sensitive apps like metaverse gaming and digital twin simulations." (PwC Africa E&M Outlook, 2023)

iii. "The In-flight Entertainment and Connectivity Market is expected to grow from USD 4.7 billion in 2021 to USD 6.1 billion by 2026, at a CAGR of 5.2% during the forecast period. The growth of this IFEC Industry (https://www.marketsandmarkets.com/PressReleases/in-flight-entertainment-communications.asp) is mainly driven by the increased demand for in-flight experience, increase in aircraft renewals and aircraft deliveries and technological

shift. The in-flight entertainment & connectivity market includes major players Thales Group (France), Viasat, Inc. (US), Astronics Corporation (US), Iridium Communications Inc. (US), Gogo LLC (US). These players have spread their business across various countries includes North America, Europe, Asia Pacific, Middle East, and Rest of the World." (marketsandmarkets.com , 2022)

iv. "Top 6 Key Market Players in In-flight Entertainment & Connectivity Market

- Thales Group (France),
- Viasat, Inc. (US),
- Astronics Corporation (US),
- Iridium Communications Inc. (US),
- Gogo LLC (US).
- Panasonic Avionics Corporation (US)

v. in-flight Entertainment & Connectivity Market Scope

Report Metric	Details
Estimated Market Size	USD 4.7 billion in 2021
Projected Market Size	USD 6.1 billion in 2026
Growth Rate (CAGR)	5.2%
Market size available for years	2017–2026
Base year considered	2020
Forecast period	2021-2026
Forecast units Value	(USD Million)
Companies covered	Thales Group (France), Viasat, Inc. (US), Astronics Corporation (US), Iridium Communications Inc. (US), Gogo LLC (US) In-flight Entertainment & Connectivity Market Dynamics
Segments covered	By Product, By Class, By Aircraft Type, By End User Geographies covered North America, Europe, Asia Pacific, Middle East, and Rest of the World

Source: (marketsandmarkets.com , 2022)

vi. "Drivers: Increase in demand for in-flight experience
Increasing air passenger traffic in Asia Pacific and developing regions, the air passengers' traffic has reached to 88% of pre-pandemic levels. The demand of IFE

is increasing rapidly. With DGCA permitting onboard Wi-Fi in India for commercial flights in 2020, the passengers are looking towards it as an experience rather than travel. According to Honeywell, passengers are willing to pay premium for services in flight like customized content. Passengers nowadays are using more devices than ever before in-flight. According to SITA Passenger IT trends, it was revealed that 65% customers are streaming content on their own devices compared to 44% preferring seat back unit LCDs for in-flight entertainment purpose. According to Inmarsat survey, 55% air passengers consider in-flight Wi-Fi as a crucial requirement while 67% will re-book with an airline if high quality in-flight Wi-Fi is provided. Hence, increasing demand for in-flight experience is driving the growth of IFEC market." (marketsandmarkets.com , 2022)

vii. "Opportunities: Emerging markets in South-East Asia
The emerging markets contribute significantly to the growth of in-flight entertainment and connectivity market. Countries in Southeast Asia such as India, Pakistan, China, Nepal are emerging markets for IFE&C. For example, in India, majority of airlines are low-cost carriers or ultra-low-cost carriers. Indigo, GoFirst , Spice jet are the major airlines providing only economy seating in their aircrafts. Passengers don't have in-flight entertainment available to them. According to Boeing, airliners in Southeast Asian countries will require more than 4,500 airplanes to meet the growing demand. In last decade, Vietnam, Thailand and Indonesia have added the greatest number of airlines in the region. Hence, increasing demand for new aircraft is expected to drive the market for IFEC market." (marketsandmarkets.com , 2022)

viii. "Challenges: High-Cost IFE IFE&C market is characterized by high research & development and installation cost. As per Zauba data, seat electronic components cost USD 4500 for a single unit. The modem unit for connectivity cost USD 18000 per unit. The installation cost for IFE systems goes up to USD 6 million. Hence, high cost of IFEC systems might hamper the growth of the market. In-flight Entertainment & Connectivity Market Categorization The study categorizes the in-flight entertainment & connectivity based on product, class, aircraft type, end user, and by region". (marketsandmarkets.com , 2022)

ix. "Recent Developments in In-flight Entertainment & Connectivity Industry In June 2021, Thales launched AVANT UP. An in-flight entertainment system that offers features such as 4K HDR displays, in-seat power, and open operating system. The launch of the product enabled the company to strengthen its position in the global IFEC market. In May 2021, Viasat, Inc. signed a contract with JetBlue to provide in-flight connectivity (IFC) solution for its new Airbus A220-300 and Airbus A321 Long Range (LR) aircraft. The contract enabled the company to expand its customer base. In January 2021, Panasonic Avionics Corporation and IMG extended their agreement, wherein Panasonic Avionics Corporation will continue to stream Sport 24 and Sport 24 Extra sports content for its international airline customers. The agreement enabled the company to offer enhanced content to its airline customers." (marketsandmarkets.com , 2022)

1.7) Value Proposition

SMART SPECS are for Airline Companies, Bus Companies and Railway Companies that install In-Flight Entertainment in their logistics assets who need Technology Integration and need Real-Time Digital Information Communication and who are dissatisfied with a lack in Cutting Edge Technology Integration “Bring a Book” or “10inch-low sound” in In-Travel Entertainment Travel.

As Travel Passengers require more Entertainment Satisfaction and Enjoyment in Traveling Experience and Travel Transport Companies seek to improve Entertainment Satisfaction and Enjoyment in In-Travel Transport and prioritising Modern Customers in In-Travel Entertainment Travelling. Malll Design’s solution offers Cutting Edge SMART SPECS an iMAX Screen Entertainment experience, Spatial Surround Sound and AI Assistant which integrated productivity, entertainment and social messaging:

- Micro-Oled 201inch in Wearable Spectacles.
- Seamless Digital Interface unification of Smart Devices.

2.2.1) SMART SPECS CUSTOMER-END EXPERIENCE

1) Default Application Platform
   i. Built in Apple Eco-System Applications
   ii. Pre-Installed Applications
   iii. Disabled iStore Applications Download

2) Entertainment Platform (Pre-Installed)

   i. Adore Studios
   ii. Showmax/DSTV
   iii. Open Platform to Public

3) Advertising Platform

   i. In-Between Movie Ads
   ii. In-Between Series Ads
   iii. In-Between Music/Podcast Streaming Ads
   iv. In-Between Entertainment Ads
   v. Open Platform to Public

“THE UBER OF ENTERTAINMENT”

2. BUSINESS SUMMARY

2.1) Product & Suppliers

SNAPDRAGON® XR2 GEN 2 REFERENCE DESIGN

Snapdragon QXR2230P is used as a reference design based on the Snapdragon® XR2 Gen 2 SoC along with SW development and testing to help support customers in building their next generation VR/MR HMD.

The Snapdragon QXR2230P device is a form factor accurate reference design powered by the SXR2230P. This head-mounted device is engineered to help customers jump-start their next-generation VR HMD design and software development with early access to the latest technology and features from Qualcomm Technologies, Inc. Comprehensive reference design documents are available to Qualcomm Technologies customers, including schematic, PCB layout and key performance indicators. To learn more, please refer to the QXR2230P Hardware Overview document (80-36372-130).

Kit Contents

- QXR2230P HMD
- Cleaning cloth
- AC Adapter w/ USB Type-C cable
- Quick user guide

Software and Testing

- Quick load software available on Createpoint once proper licensing is in place (requires no software compiling)
- Updated Test and Tools Agreement (TTA) required for enablement

To learn more visit: qualcomm.com

Materials are subject to change without notice.
80-42722-1 Rev. A

SPECIFICATIONS AND FEATURES

Key Features

- Stand Alone VR Platform
- 2.56 x 2.56 K Dual Panel microOLED
- Pancake lens with myopia adjustment
- Room scale 6 DoF head tracking
- Hand tracking
- Eye tracking
- Video See Through
- Split Rendering
- 6 DoF Controller

Snapdragon Platform

SXR2230P, WCN7851, WCD9385, WSA8835, PMK2230, PMXR2230, PMXR2230VS, PMXR2230VE, PM8010, SMB1393 and more

Connectivity

- 2x2 Wi-Fi 802.11 a/b/g/n/ac/ax
- Bluetooth® 5.3+LE

Image and Context Sensors

- 6 DoF Tracking cameras (4x OV7251)
- RGB camera (2x S5KJD1SP13)
- Eye Tracking cameras (2x OC0TAIB)
- Accelerometer+Gyro
- Magnetometer
- Proximity sensor
- PPG sensor

Battery and Charging

- USB Type-C 3.1 Gen 2
- 6000mAh

Display and Optics

- Dual 1.03" uOLED displays 2560x2560
- Pancake lens
- Adjustable IPD and Diopter

Audio

- 4x speakers (2x woofers, 2 tweeters)
- 6x DMic

SNAPDRAGON QXR2230P REFERENCE DESIGN

Height x width x depth:
71.8 x 165.4 x 263.7mm

RAYNEO HONG KONG LIMITED

Proforma Invoice

Invoice NO.:

Invoice Date: 11/28/2023

PI NO.: RN231128

PO NO.:

From:

To:

Rayneo Hong Kong Limited

Malll Design (pty) ltd

18TH Floor,128 Wellington Street, Central, HK

249 Eighth Rd, Noordwyk, Midrand, 1687, South Africa

Attn: Katty Jiang

Tel: 8613928430480

Attn: Phemelo Sihlali

Tel +27 81 401 7814

Ship to

TBD

Incoterms 2020: FCA HONG KONG

Payment term: Prepayment

Item No.	Product Description	Quantities (PCS)	Unit Price (USD)	Amount (USD)
XRGF20-2A4FEU1	RayNeo Air 2 Smrat Glasses	50	$230.00	$11,500.00
XRAC-ADA101FO	JoyDock	50	$55.00	$2,750.00
XRGF88-2ALCCN1	TCL NXTWEAR S+ Smart Glasses	50	$245.00	$12,250.00
XRAC-00E9F	Mirascreen Portable Adapter	50	$50.00	$2,500.00
	MDF(Marketing Development Fund)	1	($1,375.00)	($1,375.00)
	Shipping cost			
	Total:			$27,625.00

Account: **RAYNEO HONG KONG LIMITED**

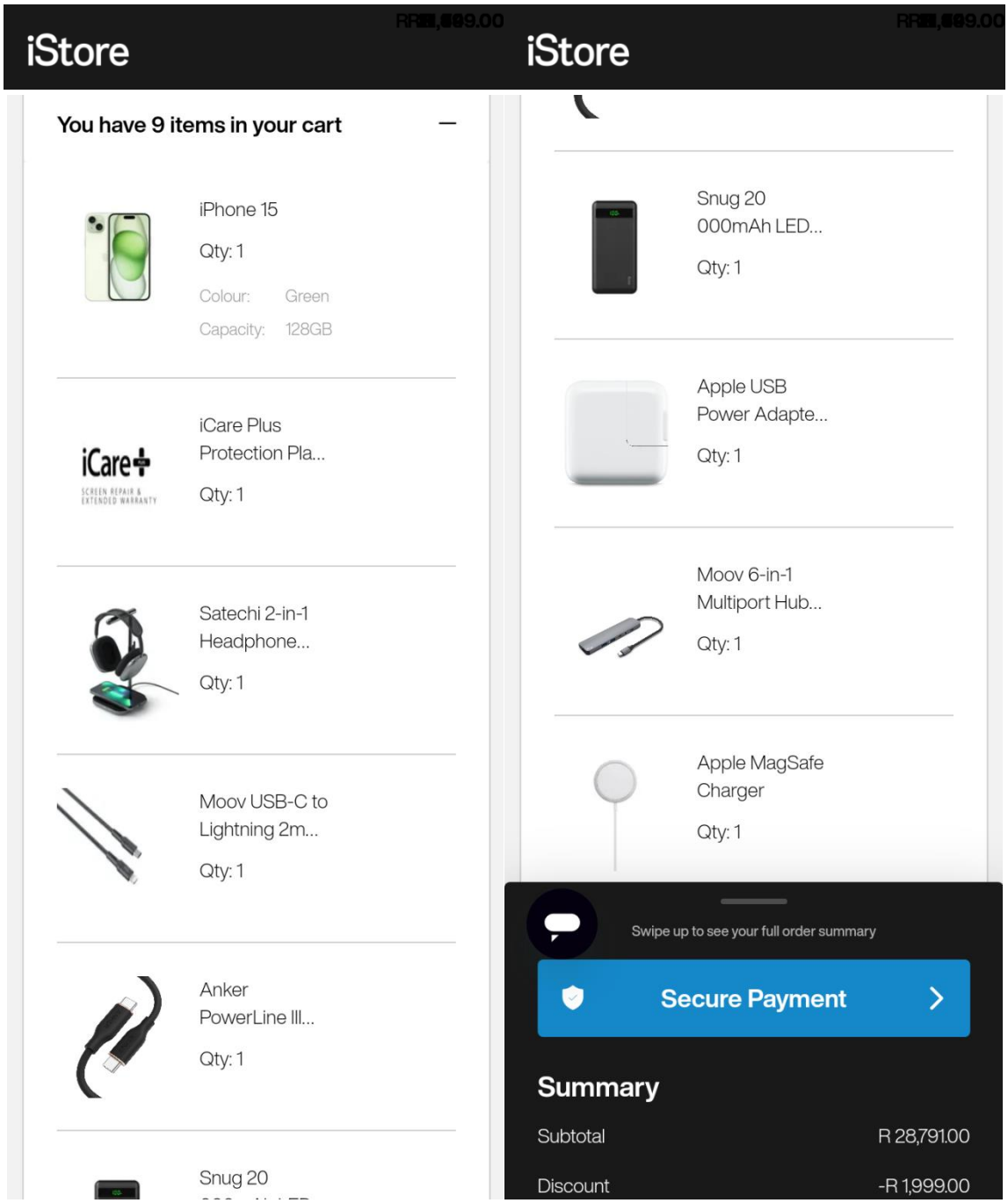
Bank: BANK OF CHINA (HONG KONG) LIMITED, HONG KONG

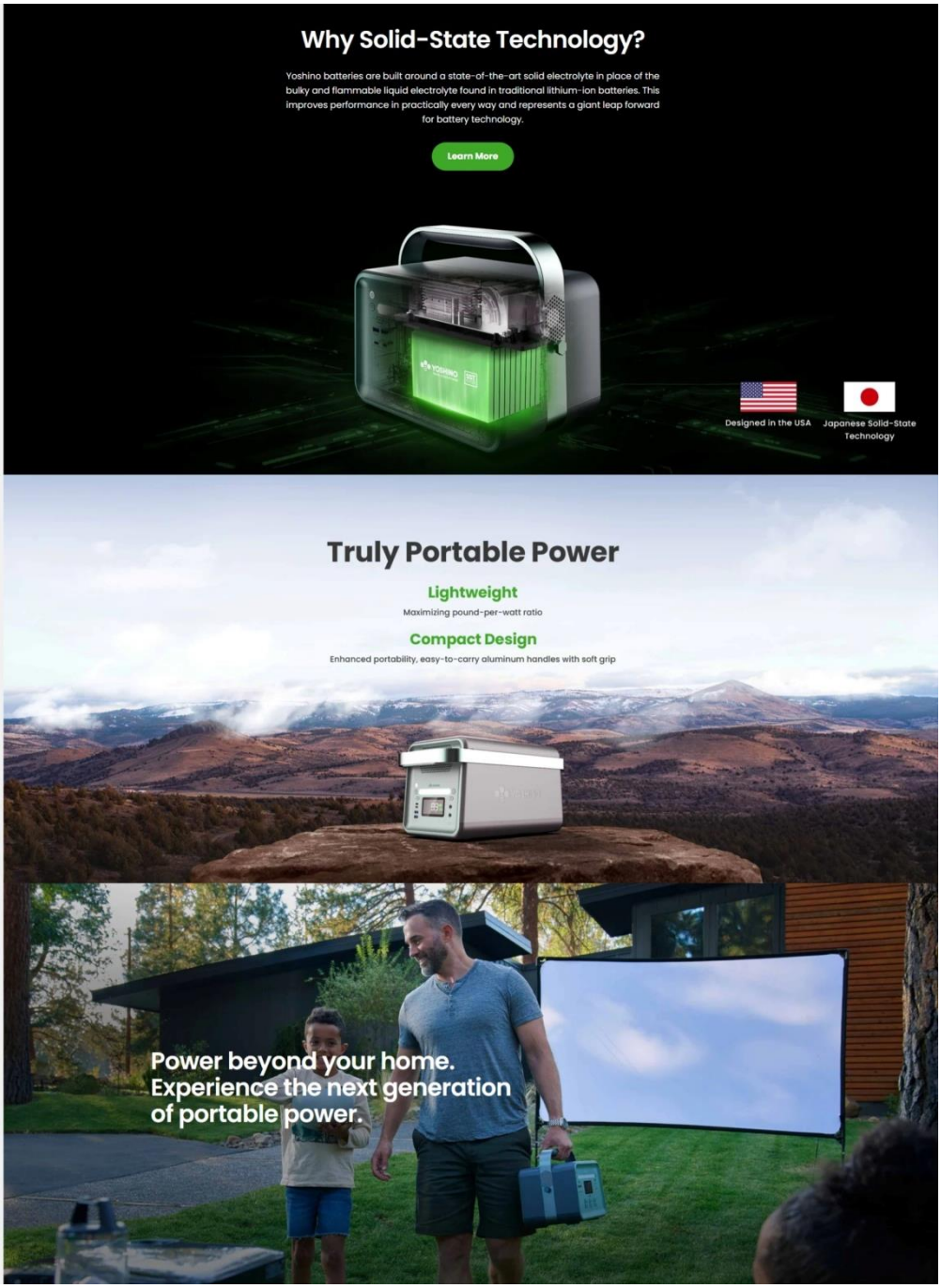
Address: BANK OF CHINA TOWER, 1 GARDEN ROAD, CENTRAL, HONG KONG

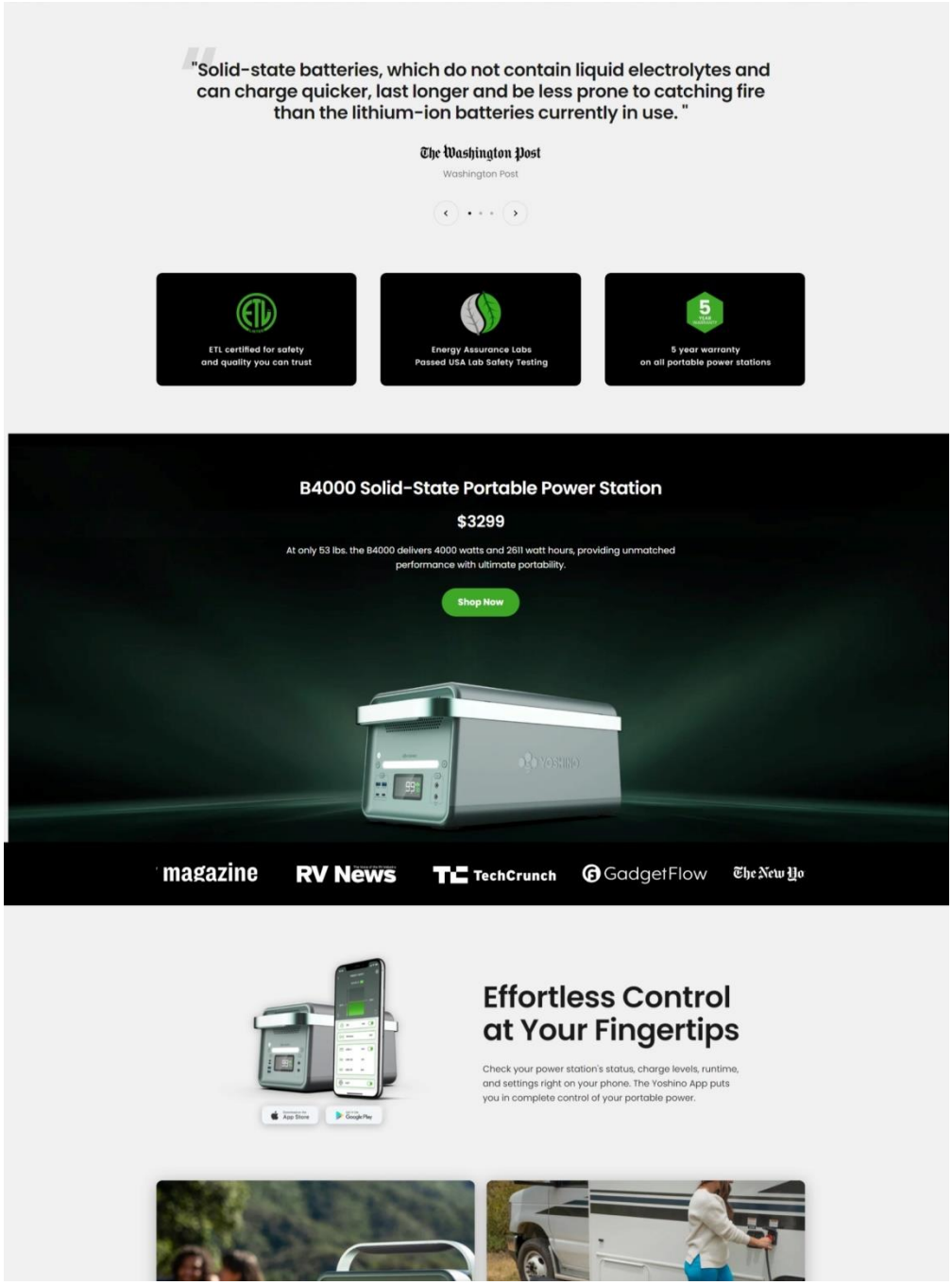
Account 012-875-2-083643-8

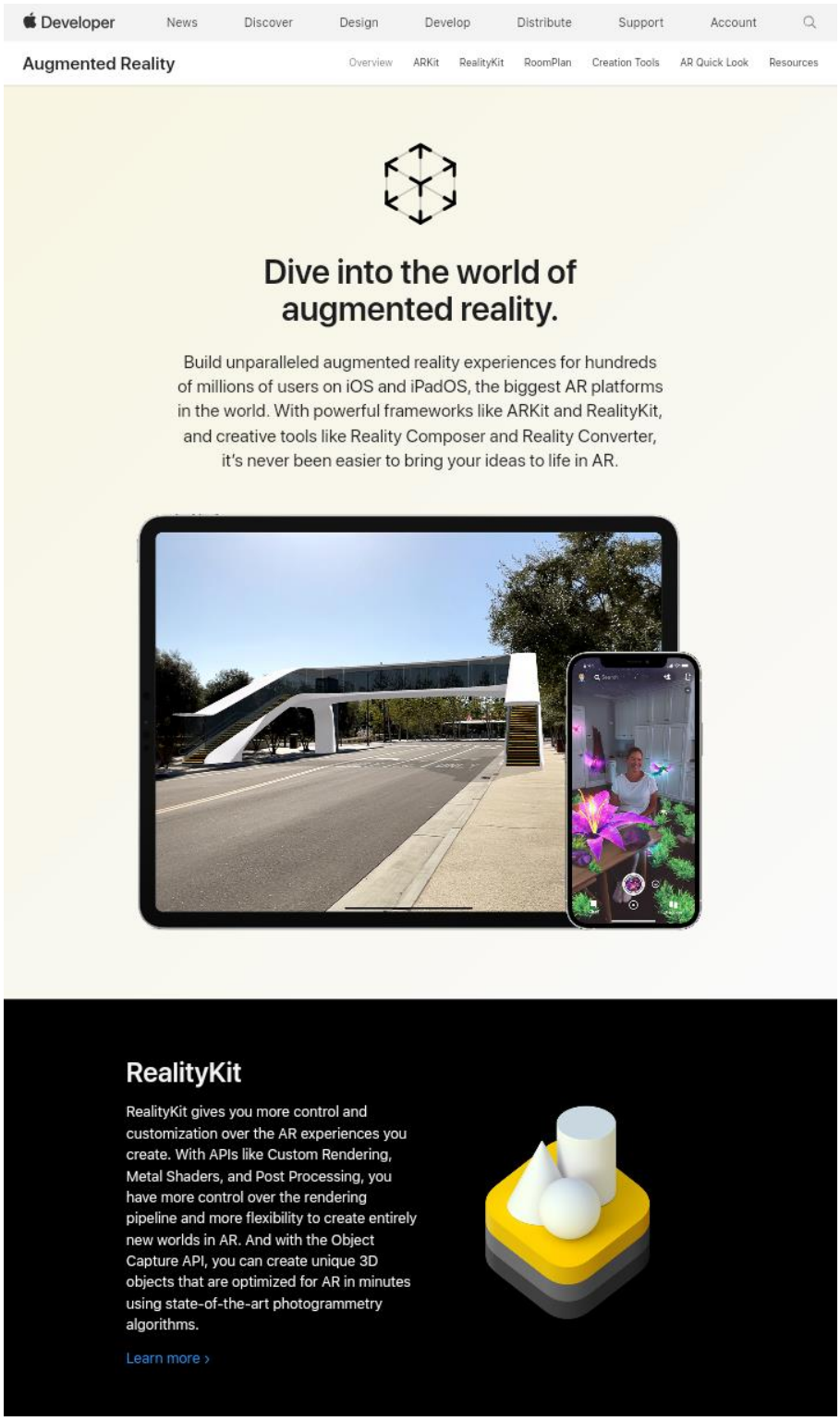
SWIFT: BKCHHKHHXXX

Bank code 012





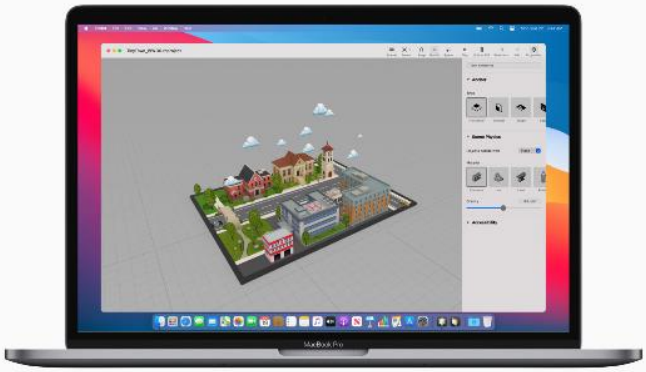




AR creation tools

Reality Composer is a powerful tool that makes it easy for you to create interactive augmented reality experiences with no prior 3D experience. Reality Converter quickly converts your existing 3D models to USDZ so it works seamlessly in our tools and on all AR-enabled iPhone and iPad devices.

Learn more ›



AR Quick Look

Place 3D objects in the real world using AR Quick Look, powered by ARKit. AR Quick Look also supports models and scenes created in Reality Composer, so you can easily create interactive experiences to be shared and viewed on iPhone and iPad.

View the Quick Look Gallery ›

AR on the App Store

Discover the unique apps and games that other developers have created with ARKit. If you're creating an amazing experience with ARKit and would like to share it with us, let us know.

View on the App Store ›

STATEMENT

ADORE
STUDIOS

05/12/2023

INVOICE NO.
ADRE257

ADORE STUDIOS
1 SALTUS STREET
PRETORIA
SHAUNHDGR@GMAIL.COM
0630894841
05/12/2023

BILL TO

MALLL DESIGN (Pty) Ltd

DESCRIPTION	QTY	UNIT PRICE(R)	TOTAL(R)
Pre-production:			
Consultation	7	1000.00	7000.00
Concept Development and Scriptwriting	7	1500.00	10500.00
Location Scouting	7	800.00	5600.00
Pre-production Planning	7	700.00	4900.00
Production:			
Professional Videographer (1 day Shoot)	7	2000.00	14000.00
Camera Equipment Rental	7	2500.00	17500.00
Lighting and Sound Equipment	7	400.00	2800.00
Travel Expenses	7	300.00	2100.00
Post- Production:			
Video Editing and Color Grading	7	1200.00	8400.00
Motion Graphics and Animation	7	600.00	4200.00
Royalty-Free Music	7	300.00	2100.00
Revisions (up to 2 rounds)	7	Included	-
		SUBTOTAL	**70000.00**

Final Deliverables for Spatial YouTube, Netflix, Instagram, Casino, Sports, Retail & Beauty, Engineering Application Videos:

- High-Resolution Video File
- Web-Optimized Video File
- Additional Formats as Needed

Remarks / Payment Instructions:

BANK – FNB
ACCOUNT TYPE – CHEQUE
ACCOUNT No.- 62533626365
BRANCH CODE - 250655

SUBTOTAL
R70000.00
DISCOUNT 35%

Balance Due **R 45 500**

2.2) Our Solution & Operation

"THE UBER OF ENTERTAINMENT"

2.2.2) SUPERIOR VISUAL QUALITY

i. These AR glasses boast an impressive contrast ratio of 100,000:1, coupled with a brightness of 1,000 nits, resulting in unparalleled visual quality. The AR content is brought to life with vivid colours, deep blacks, and bright whites, delivering a truly stunning and realistic experience.
ii. SMART SPECS are Technology integrated wearable Sun Glasses which gives the customers wearing the Glasses an Immersive Experience of 201"inch Screen, Spatial 3D Applications, Immersive Spatial Sound and an Interactive Voice to Visual AI Assistant.

2.2.3) ENHANCED PRODUCTIVITY & ENTERTAINMENT

i. These AR glasses are multifunctional, serving as a smart assistant. They come equipped with features such as call and message notifications, and music playback. This allows for seamless communication, convenient recording of moments, and music listening, eliminating the need to reach for other devices. These features not only increase productivity but also add an entertainment factor to your AR experience. These AR glasses enable screen tab opening of 6 Tabs simultaneously at a 30"inch screen size per screen.
ii. SMART SPECS connect to any compatible device through USB-Type C enabling an Enhanced Digital Experience of Electronic Devices into the Real World. This Digital Overlay into the Real World creates a better Communication & Information transfer experience, improving our knowledge and how we interact with the Real world

2.2.4) SMART SPECS TRAVEL CONFIGURATION

1. SPECS FULL SET (BUS – TRAIN – AIRPLANE)

i. TCL SMART SPECS
ii. TCL/APPLE MOBILE DEVICE
iii. MAGLEV CHARGER
iv. POWER SUPPLY CABLE & SOLID STATE BATTERY
v. CASING SOTHERING INTO UNIFIED CABLING & BOX

2. SPECS ONLY (TRAVEL RETAIL)

i. TCL SMART SPECS
ii. USB TYPE-C ADAPTER

2.2.5) SMART SPECS CUSTOMER-END EXPERIENCE

1) Default Application Platform

iv. Built in Apple Eco-System Applications
v. Pre-Installed Applications
vi. Disabled iStore Applications Download

2) Entertainment Platform (Pre-Installed)

iv. Adore Studios
v. Showmax/DSTV
vi. Open Platform to Public

3) Advertising Platform

vi. In-Between Movie Ads
vii. In-Between Series Ads
viii. In-Between Music/Podcast Streaming Ads
ix. In-Between Entertainment Ads
x. Open Platform to Public

2.2.6) During a Transportation trip, the Transportation Travelling Experience accommodates for a Modern Customer who has several smart devices, a Modern Customer that prefers to engage with an online community, a digital community and digital productivity activities for the entire length of the Transportation Travelling Experience.

This entails:

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v. Security of Smart Devices from Theft and Intimidation as devices are covert/ghost devices
vi. Personalisation through of preference through AI Applications

"Customer Centric Approach"

vii. The Market Segment of In-Travel Entertainment is ripe for disruption in terms of Enjoyability and Satisfaction as the Travel industry has focused on Speed & Cost

viii. I.e. Making a Bus Trip more enjoyable for customers, as opposed to fitting a Bigger Engine (V12) in the Bus to make the Bus faster (as a result more likely to cause accidents & discomfort) or using cheap material to make a Bus trip cheaper (as a result more likely to cause accidents & discomfort).

ix. Prioritising Enjoyability & Satisfaction over Speed & Cost

2.2.7) SOLID STATE BATTERY

i. Solid-state batteries are a new type of battery technology that uses a solid electrolyte instead of a liquid or gel electrolyte. The solid electrolyte is a material that conducts ions between the cathode and the anode of the battery. Solid-state batteries offer several advantages over current lithium-ion batteries, including:

ii. Higher energy density: Solid-state batteries have a higher energy density than lithium-ion batteries, which means they can store more energy in the same amount of space.

iii. Improved safety: Solid-state batteries are less likely to catch fire or explode than lithium-ion batteries, which use a flammable liquid electrolyte.

iv. Longer lifespan: Solid-state batteries are expected to have a longer lifespan than lithium-ion batteries, which degrade over time due to the breakdown of the liquid electrolyte.

v. Faster charging: Solid-state batteries charge faster than lithium-ion batteries

9.1.1) Battery - Power Density (Watts per m^2)

i. Battery power density refers to the amount of energy that can be stored in a given volume or weight of battery. Higher power density batteries can store more energy in a smaller and lighter package, which can be important in applications where space and weight are limited. Solid-state batteries are a type of battery that uses a solid electrolyte instead of a liquid or gel electrolyte. This has several advantages over traditional batteries, including higher efficiency and power density and operate at higher voltages than traditional batteries. This is due in part to the use of a solid electrolyte, which can withstand higher voltages without breaking down or leaking. Solid-state batteries can achieve higher energy densities than traditional batteries due to the use of advanced materials and manufacturing techniques improving safety and longer lifespans. The use of a solid electrolyte eliminates the risk of leakage or fire associated with liquid electrolytes, while also reducing the risk of short circuits and other safety hazards.

2.2.8) Organisations & Employees of the Future

i. "Value Drivers of Smart Glasses When used effectively in the right environment, smart glasses and AR displays can deliver more contextualized information, improved workflow standardization, and better performance than computers, tablets, and other existing technologies. It offers many important benefits, including hands-free support and documentation. Smart glasses provide a hands-free approach to performing tasks by providing data and virtual instructions as workers complete tasks. Audio and video capabilities allow employees to interact with other co-workers and seek help from experts within the organization on complex issues, no matter where they are in the world." (DELOITTE, 2018)

ii. "These productivity gains make supply chain operations more cost-effective, accelerate error resolution, and reduce the number of quality defects. When performing complex tasks, employees can access on-demand, interactive training videos that overlay augmented reality around them. This is especially important in industries facing an aging workforce and where critical organizational knowledge is rapidly being lost." (DELOITTE, 2018)

iii. "Companies are taking steps to reduce the risk of industry change and institutionalize knowledge by accelerating standardization and device learning to reduce time to mastery. Additionally, archival videos recorded during the performance of work tasks can be used as evidence during inspections to improve standardization and prove that prescribed procedures are followed. Companies are starting to use these capabilities for final quality inspections that require detailed checklists and documentation to be completed quickly." (DELOITTE, 2018)

iv. "Value drivers for smart glasses – When used effectively in the right setting, smart glasses and AR displays have a number of important advantages over computers, tablets, and other existing technology: contextualized information, increased workflow standardization, hands-free assistance, and documentation. Smart glasses provide a hands-free approach to performing work by providing data and virtual instructions to workers as they complete activities. Virtual instructions are being used to standardize workflows in industries with seasonal labor changes, such as ecommerce logistics, and for complex, rapidly changing tasks, such as maintenance and repair. "(DELOITTE, 2018)

v. "Through audio and video capabilities, workers can interact with other colleagues and seek assistance on complex issues from experts within their organization anywhere on the globe. Such productivity gains improve the cost-effectiveness of supply chain operations, expedite issue troubleshooting, and reduce the number of quality errors. While performing complex tasks, workers can summon interactive on-demand training videos, which overlay augmented reality on their environment. This is especially critical in industries that face an aging workforce

where significant institutional knowledge is disappearing rapidly." (DELOITTE, 2018)'

vi. "Primary potential benefits
- Increase productivity through real-time, contextualized workflows
- Reduce quality defects and rework
- Facilitate informed, real-time decision-making
- Enhance workforce collaboration
- Improve safety through standardization"
- Simplify routine workflow items such as picklists and checklists
- Decrease risk in industrial operations
- Enhance effectiveness of training programs with the use of interactive and virtual sessions
- Capture workflow analytics to identify process improvement opportunities
- Increase accountability through inspection workflow recording"

(DELOITTE, 2018)

vii. "In the short term, cheaper devices such as laptops, smartphones, and tablets will compete with smart glasses. Organizations in the hands-on services space still use paper manuals and handheld electronic devices to provide workers with the information they need, deeming them "good enough" solutions. However, in the longterm, improved device design, capabilities, and cost will tip the scale for smart glass devices beyond existing technologies" (DELOITTE, 2018)

viii. "**Store Employees of the Future TouchPoints**

1) Colleagues

i. Engaging with colleagues through digital platforms.
ii. Communicating and sharing with colleagues through Mixed Reality and digital platforms
iii. Sharing across stores and brands on experiences and learning

2) Customer

i. Engaging and Supporting Customers through and using digital platforms
ii. Guiding customers on how to make use of AI platforms to enhance their shopping experience

3) Corporate

i. Learning through Mixed Reality and digital channels
ii. Receiving communications and information via digital platforms
iii. Managing strategic workforce planning that will include people and bots"

(DELOITTE, 2018)

2.2.9) "Operating environments and perception

Companies looking to adopt augmented reality technology need to understand their employees' experience level with mobile devices and comfort with technological change. Appropriate trainings and change management processes can be implemented to help ease this transition and drive adoption. Basic considerations in this category:

- How do you expect the current workforce to respond to working with smart glasses and augmented reality?
- Are you expecting employees to share the wearable devices with others?
- How much training is required to familiarize employees with the new technology?"

(DELOITTE, 2018)

2.3. PROBLEM WORTH SOLVING & PAIN POINTS

i. **A Limited 30"inch Infortainment** Display which has lower brightness nits and a limited Touch Pad interactivity. Therefore viewers see less details of their Entertainment Content and are less engaged as a result.

ii. **A Limited Entertainment & Productivity Experience** through a 30"inch Infortainment Display that is not Immersive, which does not allow Voice Control or have any AI Assistant for convenience makes the offering a lower quality experience for customers.

iii. "Flying can make travel quicker, but hours spent sitting in the middle seat can make it seem long. For the most part, the cell phone or laptop you bring along for entertainment is only as good as the **battery life** and the media you remembered to download beforehand. That's where the airlines come in. Carriers have stepped up their game to offer more inflight entertainment options on seatback screens and passengers' own devices." (Nerdwallet , 2023)

iv. **"Technology infrastructure** –

- Smart glass and augmented reality device success depends on facilitating interaction with the right data through integration with components of a company's IT ecosystem. In doing so, smart glasses can become a part of the workflow rather than a separate technology, seamlessly receiving and transferring data with enterprise systems, software, applications, and external devices.
- What is the interaction layer for data (what data, synthesized in what way) that best supports users?
- What systems are required in the technology stack?
- What connectivity is needed and do you have it in the desired facilities?
- What parallel investments do you want to make (sensors, RFID, network, etc.) to enhance the value of the technology? " (DELOITTE, 2018)

v. "**The technology stack**

- Smart glasses and AR device hardware form just one aspect of the overall technology stack. As companies look to invest in the technology, they must consider the other elements required to implement devices in their operations and what configuration must be done to their existing IT. Understanding the impact of these elements on overall functionality and cost is important to any pilot. Companies must consider the cost of things like infrastructure improvements; additional software and operating systems, and device replacement rates that may all factor into overall budget." (DELOITTE, 2018)
- "Indeed, in a recent study of 2,000 passengers, Panasonic asked: what are you doing with your devices on the airplane? The inflight entertainment and connectivity giant learned that 92% expect to be able to fully charge their devices in-flight. "So that really helped us drive the decision to push with USB Type C and put it in there," explains Masson. This in turns tackles passengers' charging anxiety, he says, "because you probably have your ticket on your cell phone and you want to make sure, 'oh if I've connecting flight… I need my phone charged.'" But the USB-C charging connections on Astrova are also able to fast charge the latest Apple, Dell, HP, and Lenovo laptops, says Panasonic in a blog post. Additionally, depending on the passenger charging usage on board, Astrova can flex to up to 100 watts of power. "No other seat-end IFE system can fast-charge laptops," it says. Importantly, if the standard changes down the road, Panasonic can accommodate those changes without having to replace the entire IFE system, given the placement of the USB-C port in the peripheral bar of seatback implementations of Astrova. As Panasonic Avionics CEO Ken Sain notes, the flexibility of Astrova means that: "As USB-C goes to USB-D or USB-E, as Bluetooth goes 5.0 to 6.0 to 7.0, the [airline] customers will be able to change just the peripheral bar and have an upgraded system right then and there and do it on an overnight without having to do HIC [head injury criterion] tests." Panasonic has offered other in-seat power solutions as part of its embedded IFE systems for quite some time, and continues to do so. But, says Masson, "we always supplemented it with our own power." And so its push into DC power and USB-C charging is a natural extension of that work." (Runaway Girl Network , 2023)

vi. "Security

- Security is another major concern and potential barrier to the adoption of smart glasses. Given the capabilities of smart glasses to record and transmit data easily, companies will need to set restrictions on certain smart glass capabilities to protect their employees and customers.
- Given increased device-enabled workflows, what are your mitigation strategies for a network disruption?
- Do you want to restrict data capture in certain GPS locations?

- How strong is your security network to contain information flow through the devices?

(DELOITTE, 2018)

vii. Additional considerations in this category:
- Which countries do you operate in and how do regulations differ across each?
- What are the industry requirements for wearable devices in your workplace?
- What is your plan to handle intellectual property flowing globally through the devices?"

(DELOITTE, 2018)

viii. "Pricing factors
- Prices for augmented reality devices vary from the low hundreds to $5,000 or more per user setup, depending on the technology and functional capabilities.5, 6 The lower end of the spectrum consists of many simple, eyeglass-like models. Prices increase with improved computing technology, better augmented reality interfaces, and additional features such as integrated safety equipment, fire-retardant properties, and bundled handheld scanning devices. " (DELOITTE, 2018)
- "Rise in adoption rate of IFEC Airlines globally are upgrading their fleets with IFEC systems. In narrow body aircraft, new IFE systems are being installed. In India, premium carrier Vistara has upgraded its narrow body fleet of A321 NEO with Panasonic Avionics monitors and Bluebox in-flight connectivity. They have also enabled in-flight connectivity on their Boeing 787 fleet for international routes. Challenges: High-Cost IFE IFE&C market is characterized by high research & development and installation cost. As per Zauba data, seat electronic components cost USD 4500 for a single unit. The modem unit for connectivity cost USD 18000 per unit. The installation cost for IFE systems goes up to USD 6 million. Hence, high cost of IFEC systems might hamper the growth of the market." (marketsandmarkets.com , 2022)

2.3) Opportunity

Tourism

i. "Tourism supports a vibrant and complex value chain and is a sector not characterised by significant market concentration or deep vertical integration like many other sectors in SA. Activity occurs across five sub-sectors: 'Travel Distribution and Intermediaries', 'Transport and Related Services', 'Accommodation', 'Entertainment and Related Services' and 'Support and Indirect Services'. Within each sub-sector, a number of industries support a diverse range of visitor services and experiences. Tourism is therefore, fundamentally a collaborative endeavour for destination businesses in the sense that tourists experience a destination in its entirety – and the success of their experience depends on all parts of the value chain

working together seamlessly. A highly competitive tourism destination is one in which all of the linked and integrated services and inputs combine together to provide a positive experience. This requires all stakeholders to work together to plan, execute, assess and constantly improve the tourism offering and visitor experience." (DEPARTMENT OF TOURISM, 2023)

2.1.1) "Tourism Value Chain

1. **Customers**
   i. Domestic Leisure
   ii. Domestic Corporate & MICE
   iii. International Leisure
   iv. International Corporate & Mice
2. **Travel Distribution & Intermediaries**
   i. Online Travel Agents
   ii. Travel Agents
   iii. Tour Operators
   iv. Destination Management
   v. Event Managers / PCDs
3. **Transport & Related Services**
   i. Aviation
   ii. Rail Transport
   iii. Car Hire, Chauffeur & Taxi Services
   iv. Buses
   v. Mini-Buses & Specialised Vehicles
   vi. Cruises & Waterborne Travel
4. **Accommodation**
   i. Full-Service Hotels
   ii. Limited Services Hotels , B&Bs & Guesthouses
   iii. Backpacker lodges
   iv. Caravan Parks
   v. Private Rentals & Self-Catering
5. **Entertainment & Related Services**
   i. Spas & Wellness
   ii. Activations "Pop-Up" , Activities & Attractions
   iii. Conferencing, Festivals & Events
   iv. Quick Services Restaurants
   v. Bars & Dine-in Restaurants
   vi. Arts & Crafts
6. **Support & Indirect Services**
   i. Government
   ii. Financial & Business Services
   iii. Network Industries
   iv. Retail & Wholesale Trade"

Source: Tourism Sector Recovery Plan, 2021

ii. "In 2022, South Africa welcomed 5.7 million international tourists, a figure that denotes more than a twofold increase (+152.6%) from the previous year, reflecting a robust recovery from the Covid-19 pandemic. Despite this encouraging surge, the total arrivals are still down by -44.3% compared to the 2019 figures. South Africa was not spared from the near collapse in international tourist arrivals. Hotel occupancies declined significantly, leading to some small and large hoteliers being forced to close down. Airlines also curtailed operations and many tourism attractions were either closed or operating below capacity. On the other hand, the weak state of the domestic economy and the job losses impacted household disposable income negatively, limiting both the ability to and affordability of travel." (DEPARTMENT OF TOURISM, 2023)

iii. "For many countries, the tourism economy is growing faster than most other economic sectors. From a trend perspective, this is certainly the case for SA as tourism is a vital contributor to the economy. With its extensive value chain and labour absorption capacity, it is acknowledged as a tool for inclusive economic development, playing a significant role in responding to the country's socioeconomic challenges. Among these, is the provision of employment to individuals of varying skills levels, the employment of women including in rural areas and ensuring the geographic spread of tourism benefits. The sector is also a significant foreign exchange earner and impacts on the wider economy through its significant forward and backward linkages with other economic sectors. Tourism plays a critical role in the broader South African economy. As a tertiary sector with strong linkages to transportation, consumer retail, financial services and other network industries, tourism's economic contribution is substantial. According to the World Travel and Tourism Council (WTTC) country report for South Africa: 2021 and as illustrated in Figure 2 below, it was estimated that the total (direct and indirect) contribution of tourism to Gross Domestic Product (GDP) increased from R180 billion in 2020 to R195,2 billion in 2021 (3.2% of GDP), which was an increase of 8,4%." (DEPARTMENT OF TOURISM, 2023)

iv. "Major airlines have looked in recent years to take advantage of the booming streaming industry, which is expected to be worth $330 billion by 2030. In addition, 85% of U.S. percent of households have at least one video streaming subscription. JetBlue Airways, which has already had streaming partnerships with Showtime and Amazon, announced last December that Peacock would be its official streaming partner starting later this summer. Mariya Stoyanova, JetBlue's Director of Product Development, said travelers with a Peacock account will be able to stream all of the platform's content from their own devices during flights. Stoyanova added that Peacock subscribers will have access to its entire catalog without having to buy Wi-Fi" (Skift , 2023)

v. "Airlines' efforts to improve in-flight entertainment options have gotten a major assist from improvements in aircraft designs. Hawaiian Airlines is installing new in-flight entertainment systems on its Boeing 787-9, which will start flying in the first quarter of 2024. The company's 787 premium cabin will have 18-inch in-flight entertainment screens while the main cabin will offer 12-inch seatback monitors. Meanwhile, United has unveiled plans to introduce the Astrova in-flight entertainment system with Panasonic's 4K OLED TVs on its new Airbus A321XLRs and Boeing 787s starting in 2025. Why Astrova? "I think it is the biggest screen on the marketplace. They've got a range of sizes," Muren said, adding he believes Astrova provides the best hardware. "The highest definition I think that's ever flown — 4K OLED, which is better than I have in my living room."" (Skift , 2023)

vi. "Although movies, music and TV shows may be the most popular forms of in-flight entertainment, carriers such as Hawaiian Airlines also believe they can appeal to travelers by providing them with educational content. Hawaiian started running a landing video in 2021 on all inbound transpacific flights that features tips from its employees about traveling in the Aloha State. "As Hawaii's hometown airline, we have always showcased in-fight content that engages our guests in learning about the islands' people, culture and places," said Evan Nomura, director of in-flight entertainment and connectivity and onboard products at Hawaiian Airlines. "(And) as travel to Hawaii began to rebound following the relaxation of Covid-related travel restrictions, we decided it was a good time to double-down on content about how to best protect Hawaii's increasingly fragile ecosystems, care for the community and prioritize safety while at beaches, hiking, etc."" (Skift , 2023)

vii. "Likewise, American Airlines' educational offerings feature programs run by language learning software Rosetta Stone and online learning program Skillshare. "We believe that customers still very much enjoy traditional content, but entertainment goes beyond movies, TV and music," an American representative said." (Skift , 2023)

viii. "In-flight Entertainment & Connectivity Market Dynamics Drivers: Increase in demand for in-flight experience Increasing air passenger traffic in Asia Pacific and developing regions, the air passengers' traffic has reached to 88% of pre-pandemic levels. The demand of IFE is increasing rapidly. With DGCA permitting onboard Wi-Fi in India for commercial flights in 2020, **the passengers are looking towards it as an experience rather than travel.** According to Honeywell, passengers are willing to pay premium for services in flight like customized content. Passengers nowadays are using more devices than ever before in-flight. According to SITA Passenger IT trends, it was revealed that 65% customers are streaming content on their own devices compared to 44% preferring seat back unit LCDs for in-flight entertainment purpose. According to Inmarsat survey, 55% air passengers consider in-flight Wi-Fi as a crucial requirement while 67% will re-book with an airline if high quality in-flight Wi-Fi is provided. Hence, increasing demand for in-flight experience is driving the growth of IFEC market." (marketsandmarkets.com , 2022)

ix. "Opportunities: Emerging markets in South-East Asia - The emerging markets contribute significantly to the growth of in-flight entertainment and connectivity market. Countries in Southeast Asia such as India, Pakistan, China, Nepal are emerging markets for IFE&C. **For example, in India, majority of airlines are low-cost carriers or ultra-low-cost carriers. Indigo, GoFirst, Spice jet are the major airlines providing only economy seating in their aircrafts. Passengers don't have in-flight entertainment available to them.** According to Boeing, airliners in Southeast Asian countries will require more than 4,500 airplanes to meet the growing demand. In last decade, Vietnam, Thailand and Indonesia have added the greatest number of airlines in the region. Hence, increasing demand for new aircraft is expected to drive the market for IFEC market" (marketsandmarkets.com , 2022)

Rail Technology

x. "In recent years many railway operators have introduced technology to offer passengers onboard entertainment, allowing them to choose from a variety of films, games and magazines, or to track their journey in real time. From QR codes to enhance communication to a tailor-made connectivity system, here are some of the solutions rail operators are choosing to use. In 2017 Glyn Pierce-Jones, group managing editor at safety technology company Trolex Group, told Global Rail Review that technology had made it clear that passengers were no longer looking for the transport Ilaria Grasso Macola Share this article system to get them from A to B but wanted a more exciting experience." (Railway Technology, 2021)

xi. "Rail, he argued, had to embrace the change and use technology and give customers a more entertaining and connected experience. Four years have passed since that article and the industry has been receptive; in that time both companies and rail operators have invested heavily in ways to keep their passengers entertained and informed. Here we round up some of the most interesting solutions companies and railway operators have developed to make train journeys unique for passengers." (Railway Technology, 2021)

xii. "Discrimination Act compliance, which makes it mandatory for all companies to offer disabled access. "From our roots in developing award-winning, at-seat entertainment, we saw the desire for a real-time information sharing, two-way communication enabling and ultimately stress-reducing platform," commented Whoosh CEO and founder Edmund Caldecott. "We're incredibly passionate about championing the good things about rail travel and working closely with operators to transform the passenger journey experience with the Real-Time Journey Dashboard. "We've all seen a resurgence of QR use during the pandemic, and what was once a somewhat side-lined technology has really come into its own," he added. "Along with the rich capabilities and real-time information provided, it's the QR element of the RealTime Journey Dashboard really makes it stand out by enabling bespoke live content access like no other platform." (Railway Technology, 2021)

xiii. "Moment – tailor-made rail connectivity In 2019 French entertainment and digital services company Moment launched a multimedia platform specifically for the rail industry. The solution – which operates without connectivity – allows passengers to connect their electronic devices to different services, enabling railway operators to personalise their offers. Through the platform, passengers can access multimedia content as well have easier communications with the operator, accessing a range of activities from booking taxis to ordering meals onboard. "With this new offering developed for the rail sector, we want to help railway companies meet the digital challenge and transform the perception of rail journeys, making them an exclusive and relaxing moment," says Moment CEO and co-founder Tanguy Morel. More recently, the platform was tailored and adopted by OUIGO, the French low-cost TGV service for its Paris to Lyon route. "Moment's expertise and disruptive approach have proven to be decisive in implementing this new service in record time," said OUIGO Paris-Lyon project manager Nicolas Launay. "Moment technology will support our forward-looking digital strategy, tailor-made for OUIGO customers and the specifics of a low-cost business model." "Entertainment services associated with a catalogue of personalised content bring strong added value to the connectivity offering provided to passengers", said Morel at the time. "This collaboration confirms Moment's positioning as a key technological partner in this sector as rail companies seek to offer new services, even for a fee, to maintain their price competitiveness."" (Railway Technology, 2021)

xiv. "GoMedia – partnering with SBB and Eurostar In 2020, Swiss railway operator SBB adopted a new information and entertainment system provided by London-based company GoMedia. The system – which was implemented on SBB international fleet covering Germany, Switzerland and Italy – allowed customers to access entertainment in four different language – including films, TV shows and games, as well as journey information. "This deal marks a proud moment for GoMedia, launching with SBB, one of the continent's leading train operators," said GoMedia managing director Roger Matthews. "We're excited to build upon our work with PIS in the UK, and bring real-time journey information to European travellers, allowing them to feel more informed about their journey, and in turn, improving the customer experience." This is not the first time rail operators have used GoMedia's technology. In July 2019, the company won a contact with Eurostar to broaden the operator's onboard infotainment for passengers travelling between London and mainland Europe. "We are always looking to improve the customer experience, and our extended partnership with GoMedia will offer travellers a broader range of content to relax and unwind to whilst travelling at high-speed," said Eurostar digital content strategy manager Sive Hughes. Originally launched in 2016, the platform was made for Eurostar's new fleet of e320 trains. The solution used digital rights management system, providing access to games as well as films and magazines, and integrating Google Maps. "Eurostar was one of our very first customers, so we are extremely happy to be extending our relationship with them to enhance and develop the passenger experience," commented Matthews. "We are always looking for ways to extend the capabilities of our services by sourcing the

latest films, TV shows, news and gaming, and look forward to extending our offering with Eurostar in the future." I Railway operators have introduced technology to offer passengers onboard entertainment. Credit: Alyssa Pedreno-Andrada. n 2017 Glyn Pierce-Jones, group managing editor at safety technology company Trolex Group, told Global Rail Review that technology had made it clear that passengers were no longer looking for the transport" (Railway Technology, 2021)

Entertainment Content

xv. "Linear TV remains key for brand awareness and reaching audiences, while digital advertising offers short-term boosts. Broadcasters need to engage with younger audiences and make their online video streaming platform more compelling broadcasters must incorporate offerings that satisfy both requirements. Africa has uniquely been a mobile first continent with regards to gaming as opposed to the developed markets which have historically leaned more towards consoles and PCs. Much of South Africa's gaming revenue stems from mobile gaming, due to prevalence of Smartphones in South Africa. Some of the most popular mobile games include PUBG Mobile, Clash of Kings and Call of Duty Mobile." (PwC Africa E&M Outlook, 2023)

xvi. "Given the right circumstances, linear TV can still garner exceptional viewing levels. There are still occasions where families and friends gather together in a living room for a communal viewing experience in front of the TV set. Linear TVs unique selling point of reach and scale has long been considered by advertisers as the best way to reach as many eyeballs as possible and build the all-important brand awareness that they crave. Digital advertising strength is seen as offering short term call to action boosts, but TV remains key to the building and reinforcing of brands over the medium to long term. While older demographics will by large continue watching a traditional linear TV it is important that broadcasters also engage with younger audiences. To do so they need to make their own online video streaming platform increasingly compelling. As a digital linear alternative such as a free-ad supported streaming TV (FAST) continue to grow, advertisers favouring placements within a linear environment will split their budgets between traditional linear TV and online linear alternative. Traditional broadcasters need to be ready with an offer that can satisfy both requirements and so keep those revenues within their own universe." (PwC Africa E&M Outlook, 2023)

xvii. South Africa, entertainment and media spend by segment, 2018-2027 (Rmillions)

	2018	2019	2020	2021	2022	2023	2024	2025	2026
Business to Business	8 893	9 175	6 382	7 340	8 610	9 153	9 553	9 841	10 048
Cinema	1 758	1 759	305	635	1 142	1 460	1 605	1 732	1 841
Internet Access	52 317	61 188	68 002	78 349	86180	93850	101155	107931	113745
Internet Advertising	11 119	13074	14603	20286	22897	25325	27386	29299	31093
Music, Radio and Podcasts	6843	6879	4829	5436	6629	7406	7803	8156	8506
Newspapers, consumer magazines and books	11964	11717	9619	9151	8742	8522	8326	8156	7859
OOH	2735	2942	2500	2625	2834	2926	2984	3013	3024
OTT	1341	1802	2379	3280	4345	5181	5852	6466	7075
Traditional TV	31068	30367	29448	32000	32268	32675	33628	34456	35173
Video Games and esport	4017	4454	4843	5943	6440	7295	7955	8539	9056
TOTAL	130 568	141442	140703	162328	176669	189883	201724	212507	222083
Annual Growth		8.3%	-0.5%	15.4%	8.8%	7.5%	6.3%	5.3%	4.5%

Source: PwC , Omdia

xviii. "The declining influence of consumers spending on E&M products and services and the rising influence of the advertising are among the key forces changing the imperatives for the industry leaders and forcing a broad reassessment and reinvention. Competition for consumers attention and the revenue that follows is the heightening thanks in part to the steady stream of new entrants. Disney+ launched in South Africa in May 2022 and Multichoice agreed a partnership with Disney to offer access to Disney+ through its DStv platforms. Meanwhile in November 2022 Paramount announced that its streaming platform, Paramount+ would launch in Africa by 2024. The emergence of streaming services has applied pressure to traditional TV service with many now forgoing them and paying for services that instead provide an abundant amount of on-demand video content. Total TV advertising revenue contracted by -3.3% in South Africa in 2022, predominantly due to falls in terrestrial TV Advertising. But this is expected to be temporary with the segment rebounding in 2024 and forecast to increase at an overall 1.2% compound growth annual rate (CAGR) through to 2027. Meanwhile in Nigeria and Kenya, TV

advertising growth will be much stronger with CAGRs of 6.7% and 5.4% expected over the next over the next five years respectively." (PwC Africa E&M Outlook, 2023)

xix. "Digital has accounted for over half of advertising spend in South Africa since 2020 and by 2027 it is expected to nearly two-thirds of ad-spend. This broadly aligns with the global picture where digital has led since 2019 and will account for 71.98% pf ad-spend in 2027. South Africa benefits from higher internet connectivity rates and a higher per-capita GDP than many other African markets, making it a more attractive market for advertisers thus enabling higher advertising rate cards than Kenya and Nigeria. All of the three African markets profiled it is Kenya that will see the fastest growth in Internet advertising revenue over the forecast period. The 19.2% CAGR expected to 2027 will also be the fastest rate seen by any market globally, albeit this growth is coming from a low base. The E&M industry is rapidly evolving due to changing customer habits and expectations for comprehensive user experiences making it crucial to understand trends shaping the future of the industry. Millennials the largest generations globally, are digital natives who expect high-quality, new experiences in various aspects of life. This has lead to businesses particularly in the E&M industry, becoming technologically disruptive. The shift in consumer expectations has prompted to adapt to the changing landscape. Generative Artificial Intelligence, a technology that uses neural networks and machine-learning models to generate synthetic output from data, has gained attention recent years. Start up like OpenAi and Stability Ai are disrupting the market with large tech companies Google, Microsoft and Meta focusing on protecting their market share. "(PwC Africa E&M Outlook, 2023)

xx. "Mobile leads Internet advertising in South Africa as well as in Kenya and Nigeria and these formats are benefiting from the rising number of mobile internet subscribers in these markets. Social platforms have become the dominant display ad networks in Africa as there were no significant open internet solutions before these platforms started to dominate. Like in most markets globally, Google, Meta(Facebook) and TikTok are major driving forces behind growth. Of the three markets profiled, it is Kenya that will see the fastest growth in Internet Advertising revenue over the forecast period. The 19.2% CAGR expected to 2027 will also be the fastest growth rate seen by any market globally, albeit this growth is coming from a low base. First-party data is becoming increasingly central to targeted digital ads as Google prepares to phase out third party cookies from its Chrome browser by 2024. Google and Meta are in a strong position, but it is expected that a cookie-less environment will provide opportunities for Retail Media Networks. The changes will mean that companies looking to advertise their products and services online will no longer be able to rely on the data collected through the cookies tracking process to support their ad targeting activities. As such, it is expected that retail media advertising, where products are sponsored on platforms, will be boosted as advertisers can build campaigns around data those retailers have collected about their users first hand." (PwC Africa E&M Outlook , 2023)

3. Value Proposition

SMART SPECS are for Airline Companies, Bus Companies and Railway Companies that install In-Flight Entertainment in their logistics assets who need Technology Integration and need Real-Time Digital Information Communication and who are dissatisfied with a lack in Cutting Edge Technology Integration “Bring a Book” or “10inch-low sound” in In-Travel Entertainment Travel.

As Travel Passengers require more Entertainment Satisfaction and Enjoyment in Traveling Experience and Travel Transport Companies seek to improve Entertainment Satisfaction and Enjoyment in In-Travel Transport and prioritising Modern Customers in In-Travel Entertainment Travelling. Malll Design’s solution offers Cutting Edge SMART SPECS an iMAX Screen Entertainment experience, Spatial Surround Sound and AI Assistant which integrated productivity, entertainment and social messaging:

- Micro-Oled 201inch in Wearable Spectacles.
- Seamless Digital Interface unification of Smart Devices.
- AI Assistant

This transitions of upgrading from Plain Glass Spectacles to Digital Interface Spectacles is powered by Technology from Qualcomm & TCL Proprietary Intellectual Property and FCC & IC compliance License Retail Distribution

Our Business Model for Smart Specs enables MALLL Design to give customers Smart Specs As A Travel Service. The Travel Service includes:

- Smart Specs Subscription Long-Term Contract
- Integratable with latest Iphone & Android Devices ,
- TCL Cost Affordability Advantages due to scale
- BLACKBERRY & Apple Brand loyalty

By purchasing SMART SPECS Traveling Transport Companies gain an IMAX Viewing experience in Spectacles. Immersive Digital Interface inside Spectacles , Spatial Surround Sound and AI Assistant. Traveling Transport Companies gain Cutting Edge Technology, Differentiation, TCL & Apple Integration and Brand Reputation, Curated Entertainment Content, Solid State Battery Charging Device, Internet Connectivity through Qualcomm Mode, iOS Privacy, Personalisation through AI powered Applications and a Streamlined Interfacing and an Affordable Subscription Model. They also benefit through Cost Savings, Increased Revenue, Quick and Simple Installation & Integration. This is better than costly Equipment Installation & Integration; Costly Equipment; Time Consuming Installation process; Costly Equipment Ownership model; Costly Demonstration process.

2.3.1) SMART SPECS CUSTOMER-END EXPERIENCE

1) Pre-Installed Application Platform

i. Built in Apple Eco-System Applications
ii. Pre-Installed Applications (Disabled iStore Applications Download)
iii. Spatial Applications
iv. Video Streaming Spatial Applications
v. Sports Streaming Spatial Applications

4) Entertainment Platform (Pre-Installed)

i. Adore Studios
ii. Showmax
iii. DSTV
iv. Supersports
v. Open Platform to Public
vi. Advertising Platform

xi. In-Movie Ads
xii. In-Series Ads
xiii. In-Music/Podcast Streaming Ads
xiv. In-Entertainment Ads
xv. Open Platform to Public

"THE UBER OF ENTERTAINMENT"

4. GO TO MARKET STRATEGY

4.1) Retail Distribution

i. We ensure SMART SPECS have shelved priority in all Clothing & Electronics Retail outlets throughout South Africa & Africa. Giving Consumers Access.

4.2) Artist Endorsement

i. We collaborate with the Biggest and Best Artists from genres such as AmaPiano, House, Afrobeats, RnB and Hip Hop. This gives us a wide customer audience reach throughout South Africa & Africa.

4.3) Influencer Endorsement

i. We collaborate with influential Social Media Personalities in the Arts, Beauty, Food & Fashion Industries for an even wider audience reach in South Africa & Africa.

4.4) Curated Content

i. We have a dedicated Photography & Cinematography Team who ensure we produce & release Quality and engaging Content for Consumers to understand and purchase SMART SPECS.

4.5) MALLL DESIGN Services

i. Software

- We customize Immersive Spatial Applications for customers in the Enterprise and Entertainment Sectors in order to give the customers an Enhanced Experience of Digital Technology integrated into their Products & Services for their Consumers

ii. IT Technical Support

- Our customers have 24/7 Technical Support to ensure the SMART SPECS are always functional and repaired of any malfunction during the life cycle of the products. SMART SPECS have a 12 Month Warranty, Ensuring Quality.

iii. Marketing & Distro

- We ensure that all retail and marketing partners promote the SMART SPECS , it's Spatial Applications and Content on the Platform. This ensure maximum engagement and reach throughout our Operating Regions.

iv. "User-friendly design, improved ergonomics, and portability contributed to improving the overall usability of the device and reducing risks to environmental safety. These changes are noticeable in today's market: Safety glasses and augmented reality in existing industrial plants. Technology is rapidly advancing, battery life is getting longer, visual lag continues to decrease, and many devices even have lens compatibility. And the technology hype is starting to become reality. Companies have begun piloting this technology, choosing smart glasses with powerful hardware, simple and intuitive interfaces, easy integration, and an ecosystem of services and accessories. Forrester predicts that by 2025, more than 14 million workers will be using smart glasses. Corporate spending on smart glasses is expected to reach up to $4.3 billion by 2022, up from $6 million in 2016. As this market continues to grow, technology costs and barriers to adoption will continue to fall, driven by an increasing number of companies." (DELOITTE, 2018)

v. "These are the primary modes of AR implementation in retail:
"WebAR: WebAR provides a simplified and user-friendly approach to AR experiences. Unlike AR apps that require downloads and installations, WebAR allows users to access AR content directly through their web browsers, eliminating the need for additional software. But minus the ubiquity and mobility of a camera, the key function in generating the real-world component of AR, this form of tech will be reserved for very specific use cases. Naturally, among these three major form factors and suites of technology, Mobile AR is where brands and retailers are focusing much of their attention. Given the near ubiquity of smartphone technology, Mobile AR has emerged as the predominant choice for retail applications. Aside from its widespread accessibility is the application's ability to operate cross-platform on a wide array of consumer devices – both factors making it an attractive option for retailers aiming to provide immersive shopping experiences." (Arick Wierson , 2023)

vi. "The Impact of Mobile AR on Retail Mobile AR is already producing applications and use cases that serve as a harbinger of things to come in the retail space, many of which, if implemented at scale, could become absolutely transformative by enhancing the shopping experience in multiple ways: "Reduced Returns: CNBC calls it retail's "trillion-dollar problem." The issue of product returns and refunds has posed a significant challenge to retailers, particularly in the era of booming online shopping. AR addresses this problem by providing consumers with a more comprehensive understanding of products, thereby reducing return rates. This results in a win-win situation, benefiting both customers and the environment." (Arick Wierson , 2023)

vii. "Improved Self-Service: The integration of AR with physical stores enhances the shopping experience. With Mobile AR, customers can simply use their smartphones to access product information, assembly instructions, and even the backstory of a product. As an example, Home Depot's entire customer DIY

journey can now be supplemented with its AR app. This provides shoppers with a wealth of information at their fingertips, particularly when they are in the process of purchasing DIY furniture, antiques, or indoor plants." (Arick Wierson , 2023)

viii. "Expanded Customer Outreach: AR campaigns have proven highly effective in attracting and retaining consumer interest. According to a 2022 study from NAB, 60 percent of people in the U.S. are expected to be frequent AR users by 2025 (https://amplify.nabshow.com/articles/ic-what-we-can-expect-fromar-experiences/). With an increasing number of brands partnering with AR platforms to create interactive experiences that engage and excite users, this level of interest is only likely to grow. So, in effect, AR can be a hook for engaging tech-savvy, early-adopter, and AR-curious consumers. "(Arick Wierson , 2023).

5. INSTALLATIONS

5.1) GENERAL AND STANDARD TECHNICAL SPECIFICATIONS

5.1.1) General

i. The installation described in this document shall comply with various standard specifications and requirements as well as the Project Specification or Supplementary Technical Specification.

ii. The Project Specification (Part 2) shall be read as forming part of the standard specifications. Where there is any discrepancy between the Project Specification and the standard specifications, the Project Specification (Part 2) shall have preference. The Tenderer shall immediately enquire about such discrepancy.

5.1.1) Specifications and Drawings

The Engineer's drawings covering the various sections of the installation have been provided with the tender document. The working drawings of the contract shall, however, consist of:

i. The Engineer's drawings
ii. The Architect's drawings
iii. The Structural Engineer's drawings, as applicable
iv. The Engineer's drawings of other disciplines, as applicable
v. The drawings of other service installations that are relevant for co-ordination and installation purposes
vi. The installation drawings of other Contractors, where applicable. Unless otherwise stated, three sets of the Engineer's Drawings, Specifications and schedules (if any) and one set of 1.2 will be issued free of charge to the contractor for installation purposes.

a) Provisions are made in the building structure to accept the specified installation. The Contractor shall supply to the Engineer three copies of marked-up structural, or other drawings showing all builders work and/or additional requirements to be made in the structure in order to fit in dimensions of apparatus and materials to be installed by him. This information to be supplied in accordance with a programme mutually agreed upon by the Contractor and the Engineer. Copies of shop drawings, as

prescribed in Part 2 hereof, shall be submitted to the Engineer for approval and to demonstrate compliance with the contract documents.

b) Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor, manufacturer, supplier or distributor, and which illustrate relevant portions of the work. The Engineer's approval of shop drawings or samples is limited to check conformity with design requirements and shall not relieve the Contractor of responsibility for erection or installation fit, or for any deviation from the requirements of the contract unless the Contractor has informed the Engineer in writing of such deviation at the time of submission of shop drawings or samples, and the engineer has given written approval for the specific deviation. The Engineer's approval shall not relieve the Contractor of responsibility for erection or installation fit or for errors or omissions in the shop drawings or samples. The Engineer's drawings and specifications shall be considered binding with regard to the quality, quantity, general scheme, system, arrangement and function of the Contract works. All dimensions specially marked on the drawings shall be strictly followed.

c) During the execution of the work one of the sets of prints of drawings as mentioned in 1.2 above, and a specification shall be available for reference on site. Any discrepancy between the Drawings and the Specification and/or Schedules shall be drawn to the attention of the Engineer immediately such discrepancy is discovered. Upon or before receiving final payment, the Contractor shall return to the engineer all such documents bearing the Engineer's name as have been stipulated to be returned. None of the documents herein before mentioned shall be used by any of the parties hereto for any other purposes than this contract and neither of the parties shall divulge or use, except for the purpose of this contract, any information contained in these documents. A deposit may be charged by the Engineer for possession of the specification documents. This deposit will be refunded upon the return of the documents.

5.1.2) Installation

i. The equipment mentioned in this specification shall be installed complete in all respects by the Contractor for this complete contract as specified in this Specification and as indicated on the relevant drawings.

ii. Water and drainage connections (if required) will be provided as part of this contract to all equipment requiring connections. Fittings for final connections from these points to the equipment supplied shall form part of this contract.

iii. Electrical connections will be provided for all electrically operated equipment to a specific point in close vicinity (2 m) of all items of equipment. The material for the final electrical connections from these points to the various items of equipment and the final connection itself, shall form part of this contract.

iv. All equipment mentioned in this specification must be completely pre-wired and pre-piped in the manufacturer's works to form complete units, which shall be ready for installation on arrival on site.

v. All equipment shall be suitable for operation on an electrical power supply of 400/230 V, single/three phase, 50 Hz alternating current.

vi. All equipment and the installation thereof, must conform to the Occupational Health and Safety Act of 1983, as amended, with special reference to pressure vessels.

vii. All electrical equipment, installations and wiring must conform to the regulations governing such work. All conduits, control panels, control wiring, etc. are to be recessed.

5.1.3) Metric Calibration of Instruments

i. All instruments and gauges on all items of equipment shall be in the SI unit metric system.

5.1.4) Painting

i. The paintwork of all equipment, which is damaged during the course of the erection and installation and prior to acceptance, must be satisfactorily made good by the contractor(s).

5.1.5) Information to be provided with the tender

Tenderers are required to enter at the time of tender in the Schedule of materials the manufacturers of the materials and equipment, on which their tender is based, and the catalogue numbers and other information by which the materials and equipment may be identified. Sufficient details must be given to enable the unit concerned to be identified without ambiguity. It is not sufficient for a Tenderer to state in the schedules "as specified". All tender offers must be supported with descriptive literature and technical data for each item of equipment offered.

5.1.6) Commissioning and Testing

The commissioning and testing of each item of equipment and system is the responsibility of the contractor concerned with the supply, delivery and installation of the particular items of equipment and systems. All final testing shall be carried out in the presence of the engineer and all tests shall be to his satisfaction. Recognised and statutory test procedures shall be carried out on all equipment.

5.1.7) Approval of Equipment

All equipment offered must be of an approved and well-known manufacture. Only equipment of proven manufacture and quality will be considered.

Material

Where stainless steel is specified, this shall mean "chrome nickel steel" type 304 18/8 grade. grades of steel will not be acceptable.

5.2. Dimensions

The dimensions specified are maximum measurements, which must not be exceeded. Tenderers must ensure, wherever possible, that the dimensions of equipment offered can be accommodated within the spaces provided and as scaled from the drawings. This requirement is essential for the matching of associated equipment and the building layout. A workshop drawing indicating equipment layout for each building as well as all relevant dimensions shall be submitted for approval before manufacturing shall commence.

5.3. Trade Names

a) Where trade names are indicated in this specification, it should be clearly understood that such trade names are never mandatory but merely assist to identify the quality and performance of the article required by the Department. The tenderer is therefore at liberty to provide his own choice of article provided that the article is of equal quality and performance as the named article. Quality refers to:

The value of the article:

i. sturdiness/solidity in make
ii. composite materials
iii. aspect (appearance)
iv. size or volume (if important)
v. price Performance refers to: - The output of the article;
vi. economical use
vii. tamper resistance
viii. of article itself
ix. of its fixation
x. maintenance
xi. cost of
xii. ease of
xiii. accessibility for

b) Where a trade name is mentioned, it does not imply that the named article complies with the specification in all respects. It is the responsibility of tenderers to verify that equipment and/or materials offered complies with all specification requirements and is capable to perform the required duties.

5.4. The following Standard Specification as issued by the Department of Public Works, although not bound in this document, is applicable:

i. Electrical Installation and Equipment pertaining to Mechanical Services, Issue IX 1998.
ii. Standard Specification for Kitchen Equipment (Architectural)
iii. SABS 460 : Copper and Copper alloy tubing
iv. SABS 455 : Covered electrodes for the manual arc welding of carbon and carbon manganese steels
v. SABS 044 : Welding : Parts 1 to VII
vi. SABS 0238 : Welding and thermal cutting processes – Health and safety
vii. SABS 763 : Hot-dip (galvanised) zinc coatings (other than on continuously zinc-coated sheet and wire)
viii. SABS ISO 3573 : Continuous hot-dip zinc-coated carbon steel sheet of commercial, local forming and drawing qualities.
ix. SABS 0214 : The design, fabrication and inspection of articles for hot-dip galvanising.
x. SABS 1186-1 : Symbolic Safety Signs Part 1 : Standard signs and general requirements.
xi. OHS ACT : The Occupational Health and Safety Act, Act 85 of 1993.

5.2) GENERAL SPECIFICATION FOR ELECTRICAL WORK

5.2.1) REGULATIONS, LAWS AND BY-LAWS

a) The latest issue of the SABS 0142 " Code of Practice for the Wiring of Premises" hereafter called the Wiring Code"
b) The Occupational Health and Safety Act 1993.
c) The Municipal by-laws and any special requirements of the local supply Authorities.
d) The local Fire Office Regulations.

5.2.2) NOTICE AND FEES

a) The contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local supply Authority. The fee charged by the Supply Authority for connection of the installation of the supply mains, will be arranged and paid by the contractor.

5.2.3) SCHEDULE OF FACILITIES.

a) In all instances where schedules of light, socket outlet and power points are attached or included on the drawings, these schedules are to be regarded as forming part of the specification.

5.2.4) QUALITY OF MATERIALS

a) Only materials of the first class quality shall be used and all materials shall be subject to the approval of the Department. Departmental specifications for various materials to be used on this contract are attached to and form part of this specification Wherever applicable material shall comply with the relevant South African Bureau of Standards specifications, or to British Standard Specifications, where no SABS specification exist. Materials wherever possible must be of South African manufacture.

5.2.5) DELAYS

a) If the electrical contractor's work should cause any delay to the building operations, he will be held responsible for any claims arising out of such delay.

5.2.6) MAINTENANCE PERIOD AND RETENTION MONEY

a) The maintenance period shall be three months; calculated from the date the installation has been taken over by the department. Payment of the retention money will be affected after the lapse of the maintenance period and provided the installation has been in satisfactory working order during this period.

5.2.7) CONDUIT AND ACCESSORIES

a) Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof space or elsewhere will be permitted. The conduit and conduit accessories shall comply fly with the applicable SABS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

i. Screwed metallic conduit accessories: SABS 162

ii. Plain – end metallic conduit and accessories: SABS 1007
iii. Non-metallic conduit: SABS 950 Insulted heat-resistant boxes shall be used for outlets of totally enclosed luminaries and other fittings where excessive temperatures are likely to occur. Luminaires and other fittings shall no be supported by no-metallic conduit or conduit boxes. These fittings shall be secured to the surrounding structure in a way that is acceptable to the Department. The Conduit shall be supported and fixed with saddles with a maximum spacing of 1m, even in roof spaces. (Refer to SABS 0142).

b) The contractor shall supply and install ALL ADDITONAL SUPPORTING TIMBER REQUIRED. It shall be possible to rewire the completed installation in the future without undue difficulty. Non-metallic conduit and fittings shall not be used under the following conditions:

i. Outside a building (unless protected, or sheltered under eaves).
ii. For mechanical load bearing.
iii. they may be subjected to temperatures below – 10 degrees celsius or above 70 degrees celsius for prolonged periods.
iv. As primary electrical insulation.
v. In areas where they may be subjected to mechanical damage.
vi. For applications other than those for which they are designed.

5.2.8) PAINTING OF CONDUCTS

a) Exposed conduit may be painted with normal oil or PVA paints, but care must be taken to ensure that paint used does not contain any component that will soften or have any other detrimental effect on the materials from which the conduit and fittings are manufactured.

5.2.9) CONNECTING OF CONDUIT TO METAL EQUIPMENT/COMPONENTS

a) When any part of a non-metallic conduit system has to be connected to metal equipment or components (e.g. switchboards, surface socket-outlet, existing metallic conduit system etc.) fitting and joints manufactured specifically for this purpose must be used. Non-metallic conduit must not be threaded to fit metallic connectors. BEND In conduit of nominal size not exceeding 25mm, bends may be made as described hereunder. In all other cases bends must be achieved by the use of accessories that are introduced into he conduit run bends shall comply with the relevant requirements of SABS 0142

5.2.10) BENDING

a) Conductor of nominal size up to 20mm and including 25 mm may be bent by hand provided that the radius of the bend is greater than six times the nominal size of the conduit, and that the external angle of hebend does not exceed 90 degrees. The procedure (which involves the use of a bending spring) should be as follows:

i. Determine the angle through which the conduit is to be bent.
ii. Warm the cold conduit over the length to be bend by rubbing with hands.
iii. Select a bending spring which matches the conduit size and insert it into the conduit beyond the point where the bend is required.
iv. Bend the conduit slowly with one motion (either with the hands alone approximately 1 m apart, or across the knee) to double the required angle, release the conduit and, when its position is stable, withdraw the bending spring

(turning it in an anti-clockwise direction to reduce its diameter) and gently correct the angle.

v. Install and secure the conduit immediately following bending.

5.2.11) ADHESIVE JOINTS

a) All adhesive joints must be made in clean dry area. The surface of all components to be bonded must be dry and clean. The insertion depth should be marked on the conduit end and the adhesive applied (by means of a soft clean brush) as quickly as possible to the surface to be bonded by brushing lengthwise along the conduit, ensuring that a thin coating of uniform thickness is formed. The joint must be made immediately after the application of the adhesive by pushing the prepared parts squarely together with a twisting motion of the full insertion depth. Care must be taken to avoid squeezing adhesive into the cableway and all excess adhesive must be wiped off. Note. Solvent adhesive containing highly volatile liquids and their containers should not be left open. Cutting of Conduit a fine-tooth hacksaw should be used to cut conduit to the required length. Each cut end should be square and free from swarf, burrs and loose material. When determining the length of conduit to be cut, allowance must be made for the length of couplings or accessories attached to the conduit. Incorrect determination will cause bulging of the conduit or insufficient joint length.

5.2.12) CONDUIT IN ROOF SPACES

a) In roof spaces, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings. Conduit shall be secured at intervals not exceeding 1m by means of saddles fixed to the roof timbers by means of screws or acceptable clout nails. In the case of repairs and renovations, conduct runs from a distribution board shall, where possible, terminate in fabricated sheet steel draw boxes installed directly above or in close proximity to the boards.

5.2.13) WIRING

a) Except where otherwise specified in part 3 of the specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted, provided the circuits are of the same loading i.e. not mixed. No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced. Unless otherwise specified in Part 3 of this specification or indicated on the service drawings, the wiring to the installation shall be carried out in accordance with “Wiring Code”. In addition to the requirements of the “Wiring Code” concerning the installation of earth conductors of minimum size and maximum length it is a specific requirement of this document that where plain-end metallic conduit or non-metallic conduit has been used, earth conductor must be provided and drawn into the conduit with the main conductors to all points, including all lighting points throughout the installation.

b) Wiring for lighting circuits is to be carried out with 1.5mm² conductors and a 2.5mm² earth conductor. For socket outlet circuits the wiring shall compromise 2.5mm² and a 2.5mm² earth conductor. In certain instances, as will be directed in Part 3 of this specification the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduits in all other instances,

such as feeders to distribution boards, power points etc, shall be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be in accordance with “Wiring Code”. The loop-in system shall be followed throughout, and no joints of any description will be permitted. The wiring shall be done in PVC insulated 300/500 V grade cable to SABS 1507. Where cable ends connect into switches, fittings, etc. the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

5.2.13) SWITCHES AND SOCKET OUTLETS

a) All switches and switch socket outlet combination units shall conform to the Department Quality Specifications, which form part of this specification. Only 16A 3 pin sockets shall be used, unless other special purpose types are Distinctly specified or shown on the drawings. All light switches shall be installed at 1.4m above finished floor level and all socket outlets as directed in the Schedule of fittings which forms part of this specification or alternatively the height of socket outlet shall be indicated on the drawings.

5.2.14) SWITCHGEAR

a) Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-plug units, contactors, time switches, etc., is to be accordance with Departmental Quality Specifications which form part of this specification and shall be equal and similar in quality to such brand as may be specified. For uniform appearance of switchboard, only one approved make of each of the different classes of Switchgear mentioned shall be used throughout the installation.

5.2.15) SWITCHBOARDS

a) All boards shall be accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Department before installation. In all instances where provision is to be made on boards for the supply authority’s main switch and /or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met. Any construction, or standard type board proposed as an alternative to that specified, must have the prior approval of the Department. All busbars, wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other auxiliary equipment must be provided where required. Clearly engraved labels are to be mounted on or below every switch. The wording of the labels, in English shall be according to the layout drawings or as directed by the Departments, representative and must be confirmed on site. Flush mounted boards to be installed with the top of the board 2,0 above the finishing floor level.

5.2.16) WORKMANSHIP AND STAFF

a) All employees employed on the service must be under the constant supervision of a registered accredited person. The workmanship shall be of the highest grade to the satisfaction of the Department. All inferior work shall, on indication by electrical consulting engineer or the Department’s inspecting officers, immediately be removed and rectified by and at the expense of the electrical contractor.

5.2.17) EARTHING OF INSTALLATION

a) The type of main earthing must be as required by the supply authority, if other than Department's representative, who may require additional earthing to meet test standards. Where required ad earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres and brazed at all intersections. Alternatively or additionally earth rods or trench earths may be required as specified or directed by the Department's authorized representative. Installations shall be effectively earthed in accordance with the "Standard Regulations" and to the requirements of supply authority. All hot and cold water and waste pipes are to be effectively bonded by means of 12.x 1.6mm solid or perforated copper tape and brass bolts with nuts at intervals not exceeding 18m. Self-tapping screws are not acceptable as means of securing earth conductors. Connection from the main earth bar on the main board must be made at the cold water main, the incoming service earth conductor, if any, and the earth mat or other local electrode by means of 12,5mm x 1,60mm solid copper tape or 16mm² stranded (not solid) bare copper wire or such conductor as the Department's representative may direct.

5.2.18) MOUNTING AND POSITIONING OF LIGHT FITTINGS

a) The electrical contractor must note that in the case of board and acoustic tile ceilings, i.e. as opposed to concrete slabs, close-corporation with the building contractor is necessary to ensure that as far as possible, the light fittings are symmetrically positioned with regard to the ceiling pattern. The layout of the fittings, as indicated on the drawing must be adhered to as far as possible, but the exact positions must be confirmed with the Department's representative. Fluorescent fittings, installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6mm expansion or other approved type fixing bolts are to be provided. The bolts are to be ¾ of the length of the fittings apart. Fluorescent fittings to be mounted on the board ceilings shall be secured by means of two 40mm X No 10 round head screws and washers and in turn secured to the ceiling branderings. The fittings shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed ¾ of the length of the fitting apart. The use of Butterfly clips to secure the light fittings will not be acceptable. In addition to the above, an earth conductor is to be taken from the earthing terminal on all fluorescent fittings and solidly bonded onto the conduit installation. Incandescent fittings are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings, the fittings shall be secured to the brandering or joints by means of two 40mm x No.8 round head screws.

5.2.19) VARIATIONS IN EXTENT OF CONTRACT

a) The Department reserves the right to instruct the contractor to carry out variations to the contractor either in terms of clause 18 of the Standard Conditions of Contract or in accordance with prices quoted by the contractor in the Price Schedule for Variations or Bills or Quantities, whichever is applicable. For variations not provided for in the Price Schedule, Bills or Quantities the Department may call on the contractor to submit a separate written quotation. Labour and material shall be based on clause 10 of the Standard Conditions of contract, and no payment will be made for

the transport of labour and material to and from the service. The Department, however, reserve the right to execute any alterations or additions that may be necessary by others. Before any light fittings are ordered by Contractor, the makes and types of these fittings must be approved by the Department. The Department reserves the right to omit the supply for light fittings, cooking appliances and hot-water cylinders from the contract in whole or in part, and to deliver such material to the contractor by others.

5.2.20) DEPARTMENTAL MATERIAL

a) When certain materials are supplied by the Department to the contractor for installation, the contractor must arrange for taking delivery and providing safe storage of these materials. The contractor will be held responsible for all damage to or loss of such material while it is his custody.

5.3) QUALITY SPECIFICATION

5.3.1) CONDUIT AND CONDUIT ACCESS

i. General

This section covers requirements for conduit and conduit accessories for general installations under normal environmental conditions.

ii. Screwed Conduit

Conduit shall comply with SABS 162 and shall bear the SABS mark. All conduits shall be heavy gauge, welded or solid drawn, hot-dip galvanised or black enamelled. Galvanised conduit shall be hot-dipped inside and outside in accordance with SABS 763. All conduit ends shall be reamed and threaded on both sides and delivered with a coupling at one end and a plastic cap on the other end.

iii. Metal Conduit Accessories.

All metal conduit accessories shall be malleable cast iron or pressed steel with brass bushes in accordance with SABS 162. Alloy or pressure cast metal accessories or zinc base alloy fittings are not acceptable. All fittings whether galvanised or black enamelled, shall be fitted with brass screws. Accessories must be hot-dip galvanised to SABS 763.

iv. Circular Type Boxes

The boxes shall be of the long spout pattern, manufactured of malleable cast iron or pressed steel and stove enamelled jet black or galvanised as required. The two fixing holes shall be diametrically opposite each other, drilled and tapped at 50mm centres. Junction, draw-in an inspection boxes shall be adequate size and shall be supplied with heavy gauge metal cover plates.

v. Switch Boxes and Socket-Outlet Boxes

All switch boxes and socket-outlet boxes shall be manufactured of pressed galvanised of at least 1mm thickness. All boxes shall be fitted with the necessary lugs to suit standard flush mounted switches and socket-outlets manufactured in accordance with SABS 518 and SABS 1085. Only galvanised or metal wall boxes will

be acceptable to the Department, even if the tenderer offered to use non-metallic conduit and accessories. Light switch boxes shall be 100 x 50 x 50mm with two 20mm knockout on the sides and a single knockout on the top, bottom and back. Socket-outlet boxes shall be 100 x 100 x 50mm with 20mm knock-outs each on the top, bottom, sides and back. Where cavity walls are encountered tenderers must allow to install deep back (one end closed) wall boxes. Switch and socket-outlet cover plates shall comply with SABS 1084

vi. Flexible Conduit

Flexible steel conduit and adaptors shall comply with BS 731, part 1 where applicable. Flexile conduit shall be of galvanised steel construction and plastic sheathed (complex or equal). Flexible conduit shall only be used as specified and shall then be installed in accordance with SABS 0142.

vii. Plain-end Metallic Conduit

As an alternative to the threaded conduit, plain-end (unthreaded) metallic conduit with accessories may be used. Unthreaded conduit shall be manufactured of mild steel with a minimum thickness of 0,9mm and shall comply with SABS 1007. Bending and setting of conduit shall be done with the correct apparatus recommend by the manufacturer of the conduit. The Contractor or Supplier shall be responsible for obtaining the approval of local authorities for the use of the system. All conduit and accessories used in areas within 50km of the coast shall be hot-dip galvanised to SABS 763.

viii. Non metallic conduit

Non-metallic conduit shall comply with SABS 950.

ix. Earth Clamps

Earth clamps shall consist of copper strips at least 1,2mm thick and not less than 12mm wide secured with a brass bolt, nut washer and shall be so constructed that the clamp will fit firmly to the conduit without any additional packing.

POWERSKIRTING

5.3.2) General

The channel and cover shall be manufactured of 1mm thick rolled sheet steel. The channel and cover shall be epoxy coated after manufacture.

5.3.3) Outlets

Outlets pre-punched on a modular basis shall be provided to accommodate socket outlets or future socket outlets. In addition to standard lengths, covers of 250mm length shall be provided for installation on building module lines.

5.3.4) PVC-INSULATED CABLES - 600/1000 V GRADE

5.3.5) General

This section covers the requirements for PVC-insulated cables for general installations under normal environmental conditions.

5.3.6) Construction

a) Cables shall be manufactured in accordance with SABS 1507, shall come only from fresh stocks, and shall be constructed as follows:

i. Unarmoured cables - PVC-insulated/PVC-sheathed

ii. Armoured cables - PVC-insulated/PVC-bedded/armoured/black.

iii. Single core cable - PVC-insulated/unsheathed

b) The conductors shall be of high conductivity annealed stranded copper and the cores may be shaped or circular. The insulation shall be general purpose PVC, 600/1000 V Grade. The bedding shall consist of continuous impermeable sheath of PVC extruded to fill the core or cores closely and in the case of multi - core cables, to fill the interstices between the cores. Where armouring is specified it shall consist of one layer of galvanised steel wire in the case of multi-core cables and non- magnetic metallic wire in the case of single core cables. Aluminium strip or tape armouring is not acceptable. Where specified, an earth continuity conductor shall be provided in the armouring in accordance with SABS 1507.

5.3.7) PVC-Sheathed Aluminium -Covered Cables

a) Aluminium covered cables shall comprise PVC-insulated copper conductors protected by an aluminium foil tape screen and PVC sheath. Cable ends shall be made off with compression glands fitted with a neoprene ring to seal the end. Aluminium sheathed cable shall be installed on surface only, using matching saddles installed at suitable intervals to prevent sagging. Where exposed to sunlight, the cable shall have a stabilized black outer sheath.

5.3.8) Lengths

a) Cable shall be manufactured and supplied in one length to be lengths specified unless lengths exceed a standard drum length in which case a ruling shall be obtained from the Engineer.

5.3.9) Tests

At the option of the Engineer, acceptance tests shall be carried out on production runs of the cable in accordance with SABS 1507.

5.3.10) GLANDS

i. Glands to be used for terminating PVC/PVC/SWA/PVC cables shall be of the adjustable type. Glands shall be suitable for general purpose 600/1000 V Grade cable with steel armouring. The glands shall be made of nickel-plated bronze or brass. The glands shall consist of a barrel carrying a cone bush screwed into one end and a nickel-plated brass nipple carrying a nickel-plated brass or a heavy galvanised steel locknut screwed into the other end. The galvanised shall comply with SABS 763. Non-watertight glands must be easily converted to watertight glands by means of waterproofing shroud and inner seal kit.

ii. On the cable entry side of the barrel a concave groove shall be provided to accommodate the top rim of the waterproofing shroud. The shrouds shall be made of non-deteriorating neoprene or other synthetic rubber, and shall resistant to water, oil and

sunlight. The shrouds shall Ht tightly around the glands and cable. Glands shall be provided with ISO threads and shall be suitable for the specified cable sizes. Flameproof of glands shall comply with SABS 808, Group 1, 2a and 2b. Suitable accessories shall be provided with glands to be used on ECC armoured cables to facilitate a bolted lug connection of the earth continuity conductors. Groove cut into the barrel or cone bush to accommodate the earth continuity conductors are not acceptable. For unarmoured cables the cone bush and compression ring of the gland shall be replaced with a synthetic rubber compression bush and ring to provide the required grip on the outer sheath of the cable.

5.3.11) CABLE TERMINATION AND JOINTS

i. Heat-shrinkable materials

General

The complete kit shall be packed in a container that is marked for the type of cable insulation and construction as well as the voltage range for which the materials are suitable An illustrated set of instructions for the installation of the materials shall accompany every kit. The joints and terminations shall make minimal, if any use of insulating or stress relieving tapes. The use of electrical stress control and insulating tubing that is heat-shrunk onto the termination or joint is preferred above other methods. The materials shall comply with VDE 9278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials of installation. The heat-shrinkable and other materials used for the terminations and joints shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

ii. Terminations with heat-shrinkable materials

Terminations shall be made of a material that gives lasting protection against ultraviolet radiation. The cores of all cables terminated outdoors and the cores of 3.3kV and higher voltage cables terminated indoors shall be completely covered with a shrunk-on protective layer against surface tracking, ultraviolet radiation and weathering.

5.3.12) LIGHT SWITCHES

i. General

This section covers the requirements for switches for use in general installation under normal environmental conditions. Light switches of one manufacturer only, will be acceptable per project.

ii. Flush and surface mounted switches

All switches shall be suitable for mounting in 100 x 50 x 50mm boxes, shall comply with SABS 163 and shall bear the SABS mark. Switches shall be of tumbler operated micrograph type rated at 16A, 220/250V. Switches shall have protected terminals for safe wiring. Contracts shall be made of silver material. On multi-lever switches, it shall be possible to individually change any of its switches. The yoke strap shall be slotted to allow for easy alignment. The covers of surface mounted switches shall have toggle protectors. Where light switches are installed in partitions, they shall, where possible, be of the special narrow type intended for installation into the mullions.

iii. Watertight switches

Watertight switches shall be of the micrograph type suitable for surface mounting and shall bear the SABS mark. The housing shall be galvanised cast iron or die-cast aluminium with watertight cover plate and toggle. The switch shall have a porcelain base and a quick acting spring mechanism and shall be rated at 16A, 220,25OV. The ON/OFF positions shall be clearly marked on switch housing.

iv. Ceiling switches

Ceiling switches shall be rated at 10A. 220/250V and shall be suitable for ceiling mounting on a round conduit box. The switch shall be made of high impact strength nylon material. Adequate space shall be provided within the unit for ease of wiring. The switch colour shall be white and shall be fitted with a nylon cord 1,25m long.

v. Cover plates

Cover plates shall be finished in ivory coloured baked enamel, anodised bronze or aluminium unless otherwise specified. Cover plates shall overlap the outlets to cover wall imperfections. Cover plates shall comply with SABS 1084.

5.3.12) UNSWITCHED AND SWITCHED SOCKET OUTLETS

i. General

This section covers the requirements for unswitched and switched socket-outlets for use in general installations under normal environmental conditions. Switch sockets of one manufacturer only, will be accepted per project.

ii. Flush and surface mounted switched sockets

All switched socket-outlets shall be suitable for mounting on 100 x 100 x 50mm or 100 x 50 x 50mm boxes, shall comply with SABS 164 and shall bear the SABS mark. Switches shall be of a tumbler operated micrograph type rated at 16 A, 220/250V. Terminals shall be enclosed for safe wiring. Contacts shall be silver material. Safety shutters shall be provided on live and neutral openings. The yoke strap shall be slotted to allow for easy alignment. The covers of surface mounted-switched sockets shall have toggle protectors. Miniature circuit breakers shall be used in lieu of a switch where specified. Where 13 A flat pin switched socket-outlets are specified, these shall comply with BS 1363.

iii. Watertight switched sockets

The housing of watertight-switched socket shall be of galvanised cast iron or die-cast aluminium with watertight-machined joints. The switch shall have porcelain base and a quick acting spring mechanism and shall be rated at 16A, 220/250V. The ON/OFF positions shall be clearly marked on switch housing. The socket openings shall be rendered watertight by means of a gasketed cover plate which is screwed into the body of the unit. The cover plate shall be secured to the body of the unit by means of a chain.

5.3.13) TUBULAR FLUORESCENT LAMP LUMINAIRES FOR INTERIOR APPLICATIONS

i. General

Luminaires, associated equipment and control gear shall be new and unused and shall be supplied complete with lamps, control gear, diffusers, mounting brackets, etc. as applicable, and shall be delivered to site in protective covering. Lamps shall be delivered separately. Tenders shall be accompanied by fully descriptive information of luminaires offered. Photometric date, i.e. polar cubes and coefficients of utilization certified by SABS shall be made submitted tenders for all luminaries offered. 2.8.2 General technical requirements

ii. General.

Tubular fluorescent lamp luminaires shall comply fully with SABS 1119 and all amendments as well as the additional requirements of this specification. Luminaires which bear the SABS mark are preferred. The Engineer reserves the right to have samples of luminaires offered tested by the SABS for compliance with SABS 1119 the cost of such tests shall be borne by the Tenderer.

iii. Construction

A luminaire shall consist of a ventilated body manufactured of cold rolled sheet steel not less than 0,8mm thick, suitably braced or stiffened to prevent distortion. The body shall be of sufficient strength for mounting of the entire luminaire. The luminaire body shall designed to accommodate the control gear, wiring, lamp holders and, where applicable, the diffuser. It shall be possible to reach the control gear without disconnecting wiring or removing the luminaire. Except for mounting holes/or slots and the required openings in air-return luminaries, the back of the body channel shall be closed over the full length of the luminaire. Suitable knockouts shall be provided in the rear of the luminaire body for wire entry. All components, including screws, bolts and nuts utilised in the construction of the luminaire or fixing of its components, shall be corrosion proof.

5.3.14) Internal wiring

Luminaires shall be completely wired internally; Conductors shall be protected with grommets where they pass through holes in the body. The wiring shall be totally metal enclosed to prevent any possible contact with live components while changing lamps. The conductor insulation shall be rated to withstand the temperature inside the luminaire body without deterioration. The wiring shall terminate on suitable terminal block. There shall be no joints in internal wiring. An earth terminal, welded to the luminaire body, shall be provided. To ensure good earth continuity the earth terminal shall not be spray painted. The earth conductor shall be connected to this terminal means of a crimped lug.

5.3.15) Lamp Holders

Lamp holders shall be telescopic spring loaded type.

5.3.16) Control Gear

The control gear, ballasts, capacitors and starters shall be designed and manufactured to suit the control circuitry adopted. Ballasts shall comply with SABS 890 and 891, suitable for operation on 220/250 V, 50Hz supplies. Ballasts shall further be suitable for the particular luminaire to ensure that the thermal limits specified in par. 3.5 of SABS 1119 are not exceeded. Noisy ballasts will not be accepted and shall be replaced at no cost to the Client.

Starters shall comply with BS3772. Starters with metal cans shall contain integral earthing facilities to earth the can upon insertion. Starters shall be accessible from the outside of the luminaire, and the replacement of the starter shall not necessitate the removal of lamps.

5.3.17) Capacitors

Capacitors shall comply with SABS 1250. The power factor of each complete fitting shall be corrected to at least 0.85. 2.8.2.7 Lamps Fluorescent lamps shall be suitable for the control circuitry used. Lamps shall comply with SABS 1041. If no colour is specified in Project Specification, the light colour shall correspond to colour 2 (4 300K) of SABS 1041. Lamps of the same colour shall be provided for an entire installation unless specified to the contrary. There shall be no visible flicker in the lamps and lamps shall readily strike when switched on. Faulty lamps or ballasts shall be replaced at no cost to the Client.

i. Channel Luminaires

a) Channel luminaires shall consist of a ventilated, enclosed channel body with one more or more lamps as specified. The channel body channel body shall house the ballasts, capacitor, terminals and internal wiring. Provision will be made for the addition of reflector wings and/or diffusers. Three sets of mounting slots and knockouts suitable for mounting onto standard round conduit boxes and /or 20mm dia. Conduit pendant rods, shall provided in the rear of the channel, one in the centre and one approximately one sixth from each end. A knockout suitable for a 20mm dia.

b) Conduit entry shall be provided at each end of the channel. The distance between the back of the luminaire and centre of the knockout shall be approximately 25mm. The knockouts shall be positioned on the centre line of the channel. The body channel shall incorporate a removable cover acting as a reflector, manufactured of cold rolled steel, not less than 0.8mm thick, designed and mounted to completely cover the interior of the body channel and its contents and extending over the full length of the luminaire up to the lamp holders. The reflector shall be firmly held in position with a latching device consisting of knurled, coin slot, captive screws. Plastic, used as a spring mechanism, is not acceptable as fixing device for reflections. The action of the latching device shall not deteriorate due to use and/or ageing.

5.3.16) Industrial Luminaires

Industrial type luminaires shall consist of a basic channel luminaire fitted with detachable side reflections. The reflectors shall be manufactured of cold rolled steel, not less than 0.8mm thick. The reflectors shall be designed to improve the downward light output ration and decrease the upward light ratio to value of less than 2%.

5.3.17) Bulkhead Fittings with Unbreakable Polycarbonate Lens.

a) Bulkhead fitting shall be of the circular type and must be manufactured to suite the outdoor and indoor applications and to accommodate the following lamps in respect to the tube of lamps specified. The base of the fitting shall be of die cast or heavy gauge pressed aluminium. The base shall be treated against corrosion and shall have a black Matt finish. Threaded conduit entries to take 20mm diameter conduits must be provided on at least two sides and one for back entry. At least two of the conduit entries must be fitted with brass/neoprene stoppers. All control gear shall be

suitable for the supply voltage of 22.230 Volt. -5 Hz applications and shall bear the SABS mark of approval or equivalent.

b) The diffuser shall be injection moulded, prismatic, clear polycarbonate. The diffuser shall be held in position by three stainless steel screws via reinforced holes in the lens and the screws must be provided with gaskets to prevent the ingress of moisture. The fittings shall be provided with either a neoprene or silicon gasket fitted between the diffuser and the base. The internal finish of the fitting shall be of high-grade heat resistant white enamel and the fitting shall be provided with a removable metal lamp holder platforms. The fitting shall also be provided with a reflector between the lamp and the base, and wiring leads to the lamp holder shall be high heat resistant and preferably covered with silicone. The overall dimensions shall be approximately 200mm x150 deep for circular in shape fittings.

5.3.18) Flood Lights with Polycarbonate Diffuser

a) General The luminaire must be of the wall-mounted type for use with gas discharge lamps of the 125-Watt Mercury Vapour type and must be designed for the functional perimeter lighting of buildings.

Construction Details

a) Diffuser: The diffuser must be of a precise injection moulding with prisms for optimum light control and manufactured in either tough Ultra —violet resistant acrylic or in highly vandal resistant Uv sterilised polycarbonate.
b) Diffuser Frame: The diffuser frame must be of die-cast powder coated corrosion resistant aluminium casting incorporating the diffuser of which both can be removed from the body utilising one captive stainless steel screw.
c) Luminaire Body: The luminaire body must be manufactured from black epoxy coated aluminium which can incorporate all the electrical components, the reflector and the gasket which seals frame and body. A back entry hole suitable for a 20mm diameter conduit must be provided to accommodate the wiring entry and two mounting holes suitable for 60mm diameter screws must be provided as a standard feature.
d) Reflector: The reflector must be manufactured from ultra pure pre-anodised aluminium for maximum reflection.
e) Electrical: The terminal block and lamp holder must be manufactured from porcelain and the wiring must be coated with resistant silicone rubber. All control gear shall be suitable for the supply voltage of 220/230Volt 50 Hz and shall bear the SABS mark of approval or equivalent.

5.3.19) Round Wall and Ceiling Luminaires

a) Luminaires shall be of the circular type and must be manufactured to suite the outdoor or indoor application and to accommodate the following in respect of the type of lamp specified. The base of the luminaire shall be made of die-cast aluminium and stainless steel. The base shall be treated against corrosion and shall have a black Matt finish. A back entry hole suitable for a 20mm dia. Conduit must be provided to accommodate the wiring entry. All control gear shall be suitable for the supply voltage of 220/250 Volt- 50Hz and shall bear the SABS mark of approval or equivalent.
b) The diffuser shall be polycarbonate with a high impact resistance and held in position by means of a round ring with three stainless steel screws via reinforced holes in the diffuser and the diffuser screws must be provided with gaskets to prevent ingress of moisture. The fittings shall be provided with either a neoprene or a silicone gasket

fitted between the lens and the base. The internal finish of the fittings shall be of high-grade heat resistant white enamel and fitting shall be provided with a removable metal lamp holder platform. The fitting shall also be provided with a reflector between the lamp and the base, and wiring leads to the lamp holder shall be high heat resistant and preferably covered with silicone. The overall dimension shall be approximately 230mm in diameter x 115mm deep and circular in shape.

5.3.20) EARTHING ELECTODES

i. General This section covers on uncoated, coated and metal clad circular rod electrodes intended to provide an earth in soil for electrical and lightning arrestor systems.
ii. Category and type Only the following type of earth rods shall be used: 1(a) - Solid copper (b) - Solid stainless steel 2(a) - Solid steel with bonded copper protection (b) - Solid steel with plated copper protection (c) - Solid steel with a shrunk-on copper jacket 3 - Solid steel with a shrunk-on stainless steel jacket 4 - Galvanised steel
iii. Bare aluminium is not acceptable as an electrode material.
iv. All rods shall be solid and of circular cross section with length as specified in Project Specification.
v. The nominal diameter of the earthing rods shall not be less than 16mm

5.3.21) Couplings and Conductor Clamps

i. Earthing electrodes shall be provided with (n-1) couplings where n = number of rods supplied. Rods designed for coupling by means of external sleeves shall provided with an adequate quantity of hydrocarbon or silicon grease to be applied to the coupling before the joint is made. Rods designed for coupling by means of internal pins or splines shall be provided with thin-walled tubes and hydrocarbon or silicon grease to seal the joint. Conductor clamps shall be provided to suit the type and size of rods provided and the type and size of conductor specified in the Project Specification. The material of the clamps shall be electrolytically compatible with the rod and conductor materials. Where brazed or welded connections are specified, the supplier of the rods shall stipulate at least two types of metals, which are compatible with the rod and conductor materials. An adequate number of driving caps of bolts shall be supplied with rods to protect the ends earthing rods whilst being driven into hard soil.

5.3.22) SWITCHBOARDS (Up to 1kV)

i. General

Scope

This section covers the manufacturing and testing of flush mounted, surface mounted and floor standing switchboards for general installations in normal environmental conditions and for system voltage up to 1kV.

Size

All switchboards shall be of ample size to accommodate the specified switchgear and provide space for future switchgear. For every four (4x) or part of four (4x) 5 kA circuit breakers on a switchboard, space for an additional 5l

5.4) SPECIFICATION FOR ELECTRICAL WORK PROJECT SPECIFICATIONS

5.4.1) CONTRACT WORK

The installation shall be carried out entirely by the Sub-Contractor's own staff and shall not in any way be sub-let. This part of the specification shall have preference to any other part of the specification.

5.4.2) CONTRACT PRICE ADJUSTMENT

The tender price (contract sum) in this particular Sub-contract shall not be subject to price adjustment (Escalation as per Principal contract)

5.4.3) SITE

The Tenderers must, before submitting their tenders, acquaint themselves with the local conditions, accessibility of the sites, soil conditions, availability of labour and labour conditions, transport, off loading store and custody conditions for materials and equipment necessary for the completion of the total contract. No claim based on ignorance in this regard shall be considered. Permission must be obtained from the Client Representative before any Tenderer visits the site, or the Contractor establishes himself of the site.

5.4.4) EXTENT OF WORK

The work covered by this contract comprises the complete electrical installation, in working order, as shown on the drawings and as per this specification, including the supply and installation of all fittings and the installation of such equipment.

5.4.6) SUPPLY AND CONNECTION

The Consulting Engineer will arrange with the Eskom for the permanent electrical supply as well as the commissioning thereof. Payment of the service connection shall be made by the Client. Electrical Sub-Contractor shall be responsible for the supply, installation and connection of all the specified low-voltage cables including the supply cable from the supply point of the Eskom.

5.4.7) INFORMATION

The tenderer's attention is drawn to the fact that if the schedules of this specification are not complete, his tender cannot be adjudicated and may be disqualified.

5.4.8) SPECIFICATION AND DRAWINGS

The specification and drawings generally show the character and extent of the proposed work, and shall not be held as showing every minute detail of the work to be executed. Tenders must ensure that their copy of the specification is complete and that all drawings as listed have been received. Any discrepancy must immediately be brought to the attention of the Engineer.

5.4.9) Contract Drawings

The layout and extent of the electrical installation are shown on the drawings which form part of this document. The positions of all power-, light- and switch outlets or routes which may be affected by other services must be confirmed by the Contractor with the Consultant before placing such outlets.

5.4.10) "As-built" Drawings

The contractor is to prepare the “as-built” paper prints in strict accordance with this specification. These drawings are to be kept in the site office. Retention money normally due before commencement of the maintenance period will not be released until “as-built” drawings have been prepared to the satisfaction of the Engineer and the Client Representative.

5.4.11) MAKING GOOD

The successful tenderer will be responsible for making good in all trades of any damage to buildings or other services which he or his employees may have incurred during the construction of the works. The Contractor will be responsible for keeping the site clean and tidy and shall remove from the site all rubble and litter resulting from the construction work.

5.4.12) WORDING

The word “approve” means approval by the Client inspection engineer or representative.

5.4.13) SUPERVISION

Work must under all circumstances be supervised by a qualified and experienced representative of the Contractor who must be registered as an accredited person. The representative must be authorized by the Contractor and must be able to receive instructions on behalf of the Contractor.

5.4.14) ELECTRICAL EQUIPMENT

All fittings, material and equipment and component parts thereof are to be in accordance with the quality specifications and must have the approval of the Client representative. In addition all equipment shall be designed, manufactured and tested in accordance with the relevant South African Bureau of Standards Specification or otherwise the relevant British Standard Specification. All material and equipment must be suitable for the supply voltage 415/230V and the necessary precautions shall be taken against corrosion, i.e. exposed metal shall be anti-rust treated to approval and all metalwork to be galvanised or painted.

5.4.15) CONDUIT AND WIRING

a) The installation may be in galvanized steel conduit or PVC conduit. All conduits shall be concealed in the building work where possible. Galvanised steel conduit shall be screwed or plain end. Should for some reason it not be possible to conceal conduit in the building work and conduit must be surface mounted, only galvanised conduit may be used in up country areas. Steel conduit exposed to damp or weather conditions shall be galvanised to SABS 763. PVC conduit must comply with SABS 950. PVC conduit and conduit accessories must be used in areas within 50km off the coast. All conduits shall bear the stamp or approval by the SABS. All conduits, regardless of the system employed, shall be installed strictly as described in the project specification. Wiring of the installation shall be carried out as directed in the project specification. PVC conduit must be supported at 1 000mm intervals maximum. Galvanised draw wires must be provided in all conduits provided for other services. All steel conduit joints in concrete slabs and all running joints must be painted. No chasing by hammer and chisel will be accepted. Slots for conduits must be cut where necessary.

b) The metal conduit installation must provide a continuous earth. Bushes on metal conduit shall be of brass only. All outlet box cover plates must be metal and steel outlet boxes must be hot-dipped galvanised to SABS 763. Blank cover plates on round outlet boxes must be fixed with flat head brass screws and a gasket to seal the box. Blank cover plates on 100 x 100 mm outlet boxes must be fixed with two countersunk chrome screws. Where outlet boxes or draw boxes are mounted on finished surfaces the Electrical Contractor shall take care that such outlets are mounted symmetrically. It will not be sufficient to scale the position of any outlet off the drawings. No extra payment will be allowed where the outlets are not mounted symmetrically and have to be changed. Draw boxes on the lead in sleeves/conduits for the supply to toilet blocks must be flush mounted and must be fitted with weatherproof lids which must have levelled edges. The lids must be fixed with tamper resistant screws to the boxes and must in general comply with the specification on distribution board doors. The draw boxes may not be smaller than 100 x 100 mm. Standard factory made boxes may be considered if submitted beforehand to the Consultant for approval.

5.4.16) SWITCHES AND SOCKET OUTLETS

All switches and socket outlets shall conform to the quality specification and must be approved by the Client's representative.

5.4.17) FLUSH AND SURFACE MOUNTED SWITCHES.

All switches shall be suitable for mounting in100x50x50mm boxes shall comply with SANS 1663 and shall bear the SANS mark. Switches shall be of tumbler operated micro gap type rated at 16A, 220/250V. Switches shall have protected terminals for safe wiring.

5.4.18) WATERTIGHT SWITCHES

Water tight switches shall be of the micro gap type suitable for surface mounting and shall bear the SANS mark. The housing shall be of galvanized cat iron or die cast aluminium with watertight cover plate and toggle. The switch shall have a porcelain base and a quick acting spring mechanism and shall be rated at 16A, 220/250V. The installation of switches and socket outlets shall be carried out in accordance with the project specification. Light switches must be mounted 1 400mm a.f.f.l. Switch socket circuits must be protected by 30mA earth leakage units. Light switch and switch sockets of one manufacturer only, will be accepted. Screws linger than 30 mm to mount light switches or switch socket outlets will not be accepted.

5.4.19) FLUSH AND SURFACE MOUNTED SWITCHED SOCKETS

All switched sockets-outlets shall be suitable for mounting in 100x100x50mm. Terminals shall be enclosed for safe wiring. Where 13A flat pin socket-outlets are specified, these shall comply with BS 1363.

5.4.20) WATER TIGHT SWITCHED SOCKETS

The housing of watertight switched sockets shall be of galvanized cast iron or die aluminium with watertight machined joints. The switch shall have a porcelain base and quick acting spring mechanism and shall be rated at 16A.220/250V. The socket openings shall be

rendered watertight by means of a gasket cover plate which screwed into the body of the unit. The cover plate shall be secured to the body of the unit by means of a chain.

5.4.21) DISTRIBUTION BOARDS

i. General

Supply and install the distribution boards in the position shown on the drawings. One spare 25 mm diameter and three spare 20 mm diameter conduits must be supplied from all distribution boards to roof spaces. Five sets of factory drawings on all distribution boards must be submitted for inspection before manufacture of the distribution boards commence. The Department must be notified at least two weeks in advance of the completion of the distribution boards in order that an inspection may be carried out before delivery.

ii. Construction

The construction must be in accordance with SABS standards. All distribution boards must be flush mounted and must have doors which must be pad lockable. The current capacity of bush bars may not exceed 1.6 A. Openings into distribution boards must tie up with the installation. Cables must be mounted with “K”-clamps to the distribution board tray. Earth rings and glands must be used to earth cable armouring inside distribution boards.

iii. Installation

The distribution boards must be placed in such a way that the Building can build them into the walls where applicable. Special provision must be made that the distribution board tray is not damaged while being built in. The distribution boards must be placed in the position shown on the drawings. All distribution boards must be installed level. Apparatus and requirements by the Supply Authority are not indicated on the distribution board diagram and schedules. It is expected of the Electrical Contractor to install all such apparatus, accessories and systems as may be required by the Supply Authority, as part of the electrical contract price. A neutral bar associated with each bank of mccb’s must be positioned below each bank of mccb’s and must be wired in the same sequence as the mccb’s. Not more than one conductor per connector will be accepted. Only hydraulic-magnetic operated mccb’s must be used if the new micro ranges are not used. Excluding the metering kiosk, 2.5 kA circuit breakers may be accepted in distribution boards. The minimum conductor size between lightning arrestors and earth shall be 4mm². Busbar stubs must be provided where more than one conductor terminates on equipment. Electrical Installation Specifications Earth conductors must be fastened with two screws and shoes to earth bars. Two (2x) keyed alike with 016 keys, Standard padlocks must be provided with the Meter Kiosk.

5.4.22) LABELLING

Circuits which are not wired must be marked “SPARE” on the distribution boards. Labels indicating the supply point and size of the supply cable must be provided on each distribution board. Where switchboards are positioned behind doors of building structure i.e. build-in cupboards, a suitable approved electrical danger sign as well as the applicable distribution boards designation label must be supplied and fitted in a suitable position on the outside top section of one of the entrance doors at each such location.

5.4.23) POWER DISTRIBUTION BOARDS

Supply and install the power distribution boards in the position shown on the drawings. The power distribution board should have:

i. It should have a dedicated mounting plate for device installation.
ii. A front plate to block direct access to live parts.
iii. Prefabricated busbar connections
iv. Systems for on-site connections and running of auxiliary wires.
v. Vertical and flat bars.
vi. Specific enclosure models dedicated and optimized to receive functional inputs.

a) The equipment shall be installed and secured to the floor in accordance with the manufacture's specification. Five sets of factory drawings on all distribution boards must be submitted for inspection before manufacture of the distribution boards commence. The Department must be notified at least two weeks in advance of the completion of the distribution boards in order that an inspection may be carried out before delivery.

5.4.24) Construction

The construction must be in accordance with SABS standards. All Power distribution boards must have doors which must be pad lockable. Openings into distribution boards must tie up with the installation. Cables must be mounted with "K"-clamps to the distribution board tray. Earth rings and glands must be used to earth cable armouring inside power distribution boards.0

5.4.25) Installation

All Power distribution boards must be installed level. Apparatus and requirements by the Supply Authority are not indicated on the Power distribution board diagram and schedules. It is expected of the Electrical Contractor to install all such apparatus, accessories and systems as may be required by the Supply Authority, as part of the electrical contract price. A neutral bar associated with each bank of mccb's must be positioned below each bank of mccb's and must be wired in the same sequence as the mccb's. Not more than one conductor per connector will be accepted. Busbar stubs must be provided where more than one conductor terminates on equipment. Earth conductors must be fastened with two screws and shoes to earth bars.

5.4.26) LABELLING

Circuits which are not wired must be marked "SPARE" on the Power distribution boards. Labels indicating the supply point and size of the supply cable must be provided on each Power distribution board.

5.4.27) POWER POINTS

The Contractor shall make allowance for the complete installation of all power points as indicated on the drawings and described hereunder-: All sockets or switch boxes shall be manufactured of pressed galvanized steel of at least 1mm thickness. All boxes shall be fitted with the necessary lugs to suit standard flush mounted switches and sockets manufactured in accordance with SANS 1085. Switch and socket cover plates shall comply with SANS 1084.

6. BALANCING OF LOAD

The electrical contractor is required to balance the load as equally as possible over the multi-phase supply.

5.4.28) EARTHING OF INSTALLATIONS

a) Installations shall be effectively earthed in accordance with the “Standard Regulations” and to the requirements of the supply authority, as well as the Eskom’s Representative, who may require additional earthing to meet test standards. Earthing must comply with S.A.B.S 0142 – 1993. All hot and cold water as well as waste pipes must be effectively bonded by 12.5 x 1.6mm solid or perforated copper tape (not wire) clamped by means of brass bolts and nuts. The tape is to be fixed to walls by means of roundhead brass screws at intervals not exceeding 150 mm. The earth connection from the main earthbar in the mainboard must be made to the cold watermain and the incoming service earth conductor by means of 16mm² stranded (not solid) bare copper earth wire or such conductor as the Eskom’s Representative may direct. Where applicable all steel roofsheeting as well as steel walkways and stairs shall be suitably earthed. Furthermore and earth electrode (earth spike) of at least 1,5m long must be provided and driven into the ground at the centre of each gable-end wall of each individual block.

b) These earth electrodes shall be installed at least 1 m from the building’s perimeter and shall clear all aprons and water channels. These earth spikes must be driven into the ground to at least 300 mm below ground level and only after final bonding and tests have been carried out must proper backfilling and compacting of same be executed. In each instance these earth spikes must be interconnected by means of a 16mm² stranded bare copper earth conductor which must be installed in the inside of the ridging of the roof structure, encased in 20mm flush conduits installed in the gable walls. This earth conductor must be bonded to the roof sheeting at intervals not exceeding 5 m, ensuring that roof sheeting on both sides of the ridging are properly bonded, as specified in the project specification. The overall earth resistance at the Main Distribution Board shall not exceed 10hm. The contractor shall assess the soil and site conditions at the time of tendering and allow for this to enable him to perform the proper earthing and bonding of all installations.

5.4.29) LUMINAIRES

a) Supply and install the luminaries schematically indicated on the drawings. The luminaires must comply with the requirements and the particulars listed hereunder. The required luminaires types are specified on the drawings and tie up with the types indicated on the layouts. Samples of all luminaires must be approved by the client representative before any order is placed. All control gear within luminaires, shall bear the stamp of approval by the SABS. The installation of luminaires must be done in accordance with the relevant clauses in the general project Electrical Installation Specifications specification. All luminaires must be complete with lamps and where necessary, control gear. Starters of fluorescent luminaire for starters must be covered to the approval of the client representatives. Lamp holders for GLs lamps must be porcelain or heavy duty brass. The following luminaires are indicated on the

respective drawings and must conform to the general project specifications of this contract.

5.4.30) Light Fitting

a) Specifications for 4 Classroom Block and 2 Computer Laboratories Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed. TYPE A: 4x58 Watts LBR fluorescent light fitting.
b) TYPE B: 26 Watts water resistant LED bulkhead light fitting with 50 000hrs lifetime
c) TYPE C: Battery back up emergency.
d) TYPE D: 2x58 Watts fluorescent light fitting.
e) TYPE E: 26 Watts water resistant LED wall mounted bulkhead light fitting with 50 000hrs lifetime

5.4.31) Light Fitting

a) Specifications for 2 Classroom Block and 1 Computer Laboratory Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed. TYPE A: 4x58 Watts LBR fluorescent light fitting.
b) TYPE B: 26 Watts water resistant LED bulkhead light fitting with 50 000hrs lifetime
c) TYPE C: Battery back-up emergency. TYPE D: 2x58 Watts fluorescent light fitting.
d) TYPE E: 26 Watts water resistant LED wall mounted bulkhead light fitting with 50 000hrs lifetime

5.4.32) Light Fitting

Specifications for Administration Block. Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed.
TYPE A: 4X58 Watts LBR fluorescent light fitting.
TYPE E: Battery back up emergency light.
TYPE F: Signage Entrance/Exit.
TYPE G: 117 Watts LED Floodlights with 60 000hrs lifetime.
TYPE H: 26 Watts water resistant LED bulkhead light fitting with 50 000hrs lifetime

5.4.33) Light Fitting

Specifications for Library Resource Centre Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed.
TYPE C: Battery back-up emergency light.
TYPE D: Signage light Entrance/Exit.
TYPE E: 26 Watts water resistant LED bulkhead light fitting with 50 000hrs lifetime

5.4.34) Light Fitting

Specifications for Multi-Purpose Hall Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed.
TYPE A: 160 Watts LED low bay light fitting with 60 000hrs – 90 000hrs lifetime
TYPE B: 2x58 Watts fluorescent light fitting.
TYPE D: Battery back up emergency light fitting
TYPE E: Signage light Entrance/Exit.
TYPE F: 117 Watts LED Floodlights with 60 000hrs lifetime..
TYPE G: 26 Watts water resistant LED bulkhead light fiting with 50 000hrs lifetime

TYPE H: 5x250 Watts spotlight for stage 3.21.6 Light Fitting Specifications for the Site Reticulation Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed.
TYPE A: 8M 62 Watts solar operated steel pole mounted LED street light fitting with 60 000hrs lifetime.
TYPE B: Steel pole mounted LED light fitting 3.5m 62 watts with 60 000hrs lifetime.
TYPE C: 117 Watts LED Floodlights with 60 000hrs lifetime.
TYPE D: 26 Watts water resistant LED bulkhead with 50 000hrs lifetime

5.4.35) Light Fitting
Specifications for the Workshop Note: All luminaires must be approved by the Consultant representative prior to the installation of or any order being placed.
TYPE A: 250 Watts high bay light fitting with 60 000hrs – 90 000hrs lifetime.
TYPE B: Battery back up emergency light fitting.
TYPE C: 4x58Watts fluorescent light fitting.
TYPE D: 26 Watts water resistant LED wall mounted bulkhead light fiting with 50 000hrs lifetime TYPE E: 2x58 Watts fluorescent light fitting.
TYPE F: 117 Watts LED Floodlights with 60 000hrs lifetime.
TYPE H: 26 Watts water resistant LED bulkhead with 50 000hrs lifetime

5.4.36) PHOTO CELL

a) The area lighting must be switched direct by the photo cell. The photo cell must be mounted where indicated on the drawings in such a manner that the luminaires will not affect the operation of the photo cell. The photo cell must be linked with the distribution board by 3 x 1.5 mm 5 PVC conductors drawn in conduit in the roof space. The photo cell must comply to the following:-

i. Area lights must be switched ON when the illumination dropped to 50 lux.
ii. Area lights must be switched OFF when the illumination raised to 90 lux.
iii. It must be weatherproof and must have a built in time delay of approximately 40 seconds.
iv. Built in protection against voltage surges must be provided.
v. The photo cell must be mounted in an empty bulkhead type 5 luminaire, with an aluminium base. vi) A sample of the proposed photo cell must be submitted to the Engineer for approval.
vi. 16A rating must be provided.

5.4.37) CABLE TRAYS

a) The cable trays shall be manufactured from perforated rolled steel. The cable trays for the following area shall be of the following standards:

i. Vertical building ducts- hot dip galvanized to SANS 32&121.
ii. Plant rooms, substations, service tunnels-Electro galvanized baked enamel.
iii. Damp areas, exposed to weather-Hot dip galvanized to SANS 32&121.

5.4.38) SPACING OF HORIZONTAL SUPPORTS.

Horizontal trays shall be supported at the following maximum intervals:

a) 1.2mm to 1.6mm thick metal with 12mm to 19mm return trays.
b) 2.5mm thick metal trays with 76mm return.
c) Cable ladders with 76mm side rail of 2mm thickness and with crossrugs.
d) 3mm thick PVC trays with 40mm return.
e) 4mm thick PVC trays with 60mm return.

5.4.39) POWER SKIRTING.

The channel and cover should be epoxy coated after manufacture. The outlet pre-punched on a modular basis should be provided to accommodate socket outlets and future socket outlets. Two or three compartment power skirting shall be supplied and installed in the positions according to the layouts indicated on the drawing. The top compartment shall be used for power wiring and switched socket outlets, whilst the bottom compartments shall be for telephone and other light current services.

5.4.40) MODULE

Power skirting shall be manufactured from 1mm (minimum) thick sheet in approximately 2.5m lengths. Each modular cover associated with the power compartment shall be punched and prepared for installation of either a 13A or a 16A , 3 pin standard flush switched socket outlet, whether any is specified or indicated for that module or not. Where socket outlets are not installed, the punched holes shall be blanked off, painted the same colour as the power skirting and installed at the back of the covers. These blanking plates shall be easily removable to permit future installation of socket outlets.

5.4.41) SWITCHES

All switches shall be suitable for mounting in 100x50x50mm boxes shall comply with SANS 1663. Electrical Installation Specifications

5.4.42) SHAVING POINT

All shaver sockets should be a double wound isolating transformer rated at 20VA. A three hole system shall be provided to provide for 115V OR 230V systems and also to cater for various types of shaver plugs. Insertion of a shaver plug shall automatically switch on the unit by energizing the primary side of the isolating transformer. The unit should be protected against overload by a thermal overload device. The unit shall comply with BS 3052.

5.4.43) CABLES TRENCHING

a) The Contractor shall be responsible for all trenching excavation.
b) The Contractor shall, before trenching commences, familiarize himself with the routes and site conditions and the procedure and order of doing work shall be planned in conjunction with the general construction programme for other services and building requirements.
c) The contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.
d) The contractor shall take all necessary precautions and provide the necessary warning signs and/or lights to ensure that the public and /or employees on site are not endangered.

e) The Contractor shall ensure that the excavations will not endanger existing structures and roads.

5.4.44) BLASTING

Should blasting be necessary and approved by the client, the Contractor shall obtain necessary authority from the Government Departments and Local Authorities. The Contractor shall take full responsibility and observe all conditions and regulations set forth by the above Authorities.

5.4.45) ROUTES

a) Trenches shall connect the points shown on the drawings in a straight line. Any deviations due to obstructions or existing services shall be approved by the Electrical Engineer.
b) The Electrical Engineer reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates.

5.4.46) CABLE SLEEVES

a) Where cables cross the road, other services and where cables enter building, the cables shall be installed in Polyethylene (6mm thickness), asbestos cement pipes or earthenware pipes. Pitch fibre and PVC pipes are not acceptable because of the adhesion that occurs after a period of time between pipe and the sheathing or outer serving of the cables.
b) Pipes shall be joined in accordance with the manufacture's instructions.
c) Sleeves shall cross roads at right angles.
d) All sleeves shall be graded 1:400 for water drainage.
e) The ends of all sleeves shall be sealed with a non-hardening watertight compound after installations of cables. All sleeves intended for future use shall likewise be sealed.

5.4.47) BACKFILLING

a) The contractor shall not commence with backfilling of trenches without prior notification of the Electrical Engineer so that the cable installation may be inspected. Should the contractor fail to give a timeous notification, the trenches shall be re-opened at the Contractor's cost.
b) For high voltage cables (1Kv to 11Kv) a coloured plastic marking tape shall be installed 400mm above the cable. The tape shall be yellow, marked with words" ELECTRIC CABLE/ELEKTRISIE KABEL"in red. These markings shall not be more than 1m apart from centre to centre.
c) Backfilling shall be undertaken with soil suitable to ensure settling without voids. The maximum allowable diameter of stones present in the backfill material is 75mm. Electrical Installation Specifications
d) The backfill shall be compacted in layers of 150mm and sufficient allowance shall be made for final settlement. The contractor shall maintain the refilled trench at hid expense for the duration of the contract. Surplus material shall be removed from site and suitably disposed of.
e) On completion, the surface is made good to match the surrounding area.

f) In case of roadways or paved areas the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

5.4.50) CABLE MAKERS (FOR HV CABLES ONLY, EXCEPT WHERE OTHERWISE SPECIFIED)

a) Cable makers shall be provided along all HV cable routes but need only be provided along LV cable routes where specified.
b) Cable makers shall consist of concrete blocks in the shape of truncated pyramids, approx.300mmhigh, 150x150mm at the top and 250x250 mm at the bottom.
c) Brass plates shall be cast into the tops of the blocks in such a manner that they can not be priced loose. The wording “ELECTRIC CABLE /ELEKTRIESE KABEL” shall be stamped on the brass plates as well as direction arrows and the cable voltage rating.

5.4.51) INSTALLATION OF UNDERGROUND CABLES

a) Cables shall be installed at the following minimum depths below final ground level: Up to 11Kv:800mm
b) The depth of cable pipes beneath roads shall be not less than 1.1m below the formation level.
c) Where HV and LV cables have to be installed in the same trench, both shall be laid at a depth of 800mm and then covered with 200mm of soil. The soil shall then be compacted, and backfilled layer by layer and compacted until the trench is completely backfilled.
d) Cables for telephones, communication systems and other low voltages (less than 50V) shall be separated from power cables at least 1m. Cables shall be manufactured in accordance with SANS 97 and shall come only from fresh stocks.

5.4.52) STANDBY GENERATOR

a) Output of the Sets 1x 600kVA stationary indoor prime power rated diesel generator set at 0,8 power factor with the alternator wound for the supply of 400/230 volts, 3 phase, 4 wire, 50 Hz., and running at a speed of 1500 r.p.m.

1. Factory Installed Standard

i. Air Inlet
ii. Disposable Air filter
iii. Service indicator. Cooling
iv. Radiator package mounted
v. Coolant level sight gauge
vi. Low coolant level sensor
vii. Coolant drain line with valve
viii. Fan and belt guards Exhaust
ix. Dry exhaust manifold
x. Stainless steel flex fittings
xi. Exhaust flange outlet Fuel
xii. Integral narrow single wall fuel tank base
xiii. Primary fuel filters
xiv. Fuel priming pump
xv. Engine fuel transfer pump
xvi. Flexible fuel lines

2. GENERATOR
i. Class H insulation.
ii. Self Excited
iii. Class H temperature rise
iv. 450V voltage regulator with single phase sensing and load adjustment module, Power Termination ¬ Power center house EMCP controller.
v. Circuit breaker
vi. Segregated low voltage wiring termination panel.

3. GOVERNOR
i. Low emissions conversion.

4. CONTROL PANELS
i. Emergency stop pushbutton.
ii. Instantaneous phase currents
iii. Instantaneous phase and line voltages
iv. Ac Voltmeter, Ammeter &Frequency.
v. Engine Speed(rev/min)
vi. Power Factor
vii. Lube oil pressure
viii. Fault Conditions LUBE
ix. Lubricating oil .
x. Oil drain line with valves.
xi. Fumes disposal
xii. Oil filter and dipstick.
xiii. Oil cooler

5. MOUNTING
i. Integral Narrow 8hr tank base.
ii. Linear vibration isolation.

6. STARTING/CHARGING
i. 24 VOLT starting motor.
ii. 45 Amp charging alternator.
iii. Batteries with rack and cables.
iv. Battery disconnect switch.

b) Technical considerations concerning the engineering, design, maintenance requirements etc., are of the utmost importance and will weigh heavily in the adjudication of tender received and Tenderers are advised to submit the fullest possible details with their tenders. The following shall form part of this contract:
i. The termination of the supply cables onto the change-over panel of the alternator set.
ii. Plant-rooms shall be provided and tenderers are to confirm the required sizes together with all openings etc. Galvanised sound attenuators, aluminium louvers and galvanised double acoustic door form part of this contract and shall be supplied and installed by the generator set contractor.

5.4.53) DISTRIBUTION TRANSFORMER

a) This contract shall consist of the supply and installation of an indoor 500kVA transformer in the Services Building above the cable trenches. The transformer will have the following specifications: i. Rating 500kVA ii. Primary Voltage 11,000V

1. Secondary Voltage 400/231V
2. Vector Group Dyn 11
3. Tappings ±3% & ±6%
4. Off-circuit Lockable Tap Switch
5. Oil level indicator
6. Cooling ONAN
7. Mounting Arrangement Skid Base with Rollers
8. Terminations HV and LV cable boxes
9. Tank Construction Sealed welded cover All earthing of the equipment shall form part of the tender. The LV terminals of the transformer shall be designed to accept 3x150mm² 4-core PVC cables. Electrical Installation Specifications All text for the labelling shall be provided to the contractor at a later stage, but preparation and installation of labels shall be included in the rates.

6. POWER FACTOR CORRECTION

The power factor correction cubicles should be equipped with up to 5 or 4 varpact comfort power modules. The cubicles should have ventilated fans. The Distribution Board supplier should calculate the reactive and magnetizing power required by the inductive characteristics of all electrical equipment on our single line diagram. After calculating such shunt capacitors should be designed. The total power for each Power distribution board is given.

7. UNINTERRUPTIBLE POWER SUPPLY

Specification for 15kVA UPS System 30kVA UPS System Item Description Requirement

41.1) General Specifications

41.1.1) UPS Topology On-line double conversion On-line double conversion

41.1.2) In/Out phase configuration Three phase / Three Phase Three phase / Three Phase

41.1.3) Neutral Neutral passing through Neutral passing through

41.1.4) Output waveform on mains run Sinusoidal Sinusoidal

41.1.5) Output waveform on battery run Sinusoidal Sinusoidal

41.1.6) Bypass type Static and electromechanic Static and electromechanic

41.1.7) Transfer Time Zero Zero 2 Input Parameters

41.1.8) Nominal Voltage 400V Three Phase 400V Three Phase

41.1.9) Voltage Range -20% +15% -20% +15%

41.2.1) Input Frequency 50Hz to 60Hz (autosensing) 50Hz to 60Hz (autosensing)

41.2.2) Input Current THD at nominal voltage 0.98 from 50% to 100% of nominal load >0.98 from 50% to 100% of nominal load 3 Output Parameters with Mains (AC - AC)

41.3.1) Nominal Voltage 400V Three Phase 400V Three Phase

41.3.2) Nominal Power 15kVA 30kVA 3.3 Active Power 13.5kW 27kW

41.3.3) Voltage Variation (Static) ±1% ±1% 3.5 Voltage Variation (Dynamic 0- 100%; 100-0%) ±1% ±1% 3.6 THDv on nominal power (linear load)

6. Market

6.1) Minimum Viable Segment

1. IN-TRAVEL ENTERTAINMENT SEGMENT (ITE)

i. TRAVEL CUSTOMERS
ii. IN-FLIGHT ENTERTAINMENT
iii. IN-BUS ENTERTAINMENT
iv. IN-RAILWAY ENTERTAINMENT

2. IN-TRAVEL ENTERTAINMENT RETAIL CUSTOMERS

i. AIRPORT RETAIL CUSTOMER
ii. RAILWAY-STATION RETAIL CUSTOMER
iii. BUS-STATION RETAIL CUSTOMER

Top International Airlines by Regions	**Seats in 2023**
Airlink	1007312
South African Airways	267 533
Air Botswana	129 504
Ethiopian Airways	484 021
Kenya Airways	129 504
South African Airways	172 445
United	172 447
Delta	154 120
Latam Airlines	15 496
Emirates Airlines	827 837
Qatar Airlines	568 856
Turkish Airlines	245 271
British Airways	490 050
KLM	568 856
Lufthansa	245 271
Singapore Airlines	184 690
Qantas	88 712
Air China	38 362

Source: Forward Keys, June 2023

Top International Airlines by Regions	**Seats in 2023**
African Land	1 824 275
Middle East	1 738 435
Africa Air	1 594 545
Europe	1 529 590
Americas	347 065
Asia & Australia –	340 325

Source: Forward Keys, June 2023

i. "According to the International Air Transport Association (IATA), job losses in Africa's aviation and related industries was projected to reach 3.5 million. This was more than half of the region's 6.2 million aviation-related employment. Furthermore, GDP supported by aviation in the region, was anticipated to decrease by up to $35 billion. Full-year 2020 traffic was expected to plummet by 54% (more than 80 million passenger journeys) compared to 2019. It was anticipated that GDP supported by aviation in the region, could decrease by up to $35 billion." (DEPARTMENT OF TOURISM, 2023)

ii. "American Airlines in-flight entertainment

Movies and TV Depending on the aircraft, American Airlines passengers can watch a slew of movies, TV shows and live TV. These can be viewed on seatback screens and passengers' personal devices. Larger aircraft are more likely to have seatback screens, which put the entertainment options right at passengers' fingertips. Many airplanes are equipped with Wi-Fi that will let customers use their own personal devices to stream from a catalog of movies and shows. People who want to watch from their smartphone or tablet must have the American Airlines app downloaded before takeoff to be able to access the content." (Nerdwallet , 2023)

"American Airlines has taken similar steps. The company offers the use of an Apple Music subscription to stream inflight without the purchase of Wi-Fi. Passengers without a subscription can also obtain a two-month free trial that can be accessed inflight. But while Southwest Airlines, which has partnered with iHeart Radio since 2018, is open to teaming up with more services, United Airlines has opted to take a different approach. "We don't have a partnership in that space," said Mark Muren, the company's managing director of identity, product and loyalty. "But we think we've got something far better than that. We think we've got an opportunity for every single person on an airplane to pick their content on demand."" (Skift , 2023)

"As long as passengers are only watching video content from the American Airlines entertainment hub, they don't have to pay for the Wi-Fi. » Learn more: The complete guide to the American Airlines A Advantage program Music American Airlines is the first commercial airline to provide access to music streaming through complimentary inflight Wi-Fi access. Apple Music users can stream more than 50 million songs, playlists and music videos on any domestic flight with Wi-Fi. Wi-Fi American Airlines offers high-speed Wi-Fi on select domestic aircraft. Wi-Fi is available on most routes and starts at $10. If you fly

often, American Airlines has a monthly $49.95 plan that covers one device and a monthly $59.95 plan that covers two devices." (Nerdwallet , 2023)

iii. **"United Emirates in-flight entertainment**

Movies and TV United Airlines offers more than 100 channels of live TV to the viewing options aboard certain 737 United aircraft with seatback TVs. In addition to the DirecTV channels, United customers also have access to a huge collection of movies and TV series available on personal devices through the United app. Music The United Private Screening options on seatback TVs include music channels and music video playlists from Vevo. Wi-Fi United works with different internet providers to offer Wi-Fi on various domestic and international routes. The airline doesn't allow people to use Wi-Fi for voice or video calls. Pricing for Wi-Fi access varies by flight but typically starts at $8 for domestic routes. Customers can also buy a monthly or annual Wi-Fi subscription if they are frequent flyers. United MileagePlus members can pay for Wi-Fi subscriptions with miles. It costs 7,500 miles for a monthly domestic subscription or 80,000 miles for an annual domestic subscription. Meanwhile, all passengers can get free messaging on most United flights. As long as it's a Wi-Fi-equipped aircraft, you can send andreceive text messages usingmost apps that send text messages over Wi-Fi (such as iMessage and WhatsApp)." (Nerdwallet , 2023)

iv. **"Delta in-flight entertainment**

Movies and TV Delta passengers can access an extensive catalog of movies and TV shows from Delta Studio while on board. Seatback screens are also available on select aircraft, which gives customers access to up to 300 movies, on-demand TV shows and up to 15 channels of live satellite TV. » Learn more: 5 things the Delta SkyMiles program gets right Music The seatback screens provide a variety of audio content including podcasts and music curated by Spotify. Wi-Fi One of the perks of flying Delta is that the airline provides free Wi-Fi on most domestic mainline aircraft as of Feb. 1, 2023. By the end of 2024, free Wi-Fi should be available on regional and international jets as well. If you end up on a plane without free Wi-Fi, customers can still send messages free of charge on their in-flight Wi-Fi. Flyers can send messages through iMessage, Facebook Messenger or WhatsApp, provided that they already have the apps downloaded." (Nerdwallet , 2023)

v. **"Southwest in-flight entertainment**

Movies and TV Southwest passengers can watch movies and TV shows on-demand on the Southwest. They also offer live TV channels like CNN, FX and ESPN. Music The Southwest entertainment portal lets passengers stream music from iHeartRadio. There are genre-specific radio stations, artist-focused playlists and curated stations with themes like "Pass the Time" or "Kids Zone." (Nerdwallet , 2023)

"Southwest has one of the cheapest Wi-Fi plans. It's $8 per device, per flight for access and free for A-List Preferred members. The carrier does restrict Wi-Fi usage

to keep the speeds up, so passengers won't be able to watch videos from streaming services like Netflix or HBO Go." (Nerdwallet , 2023)

vi. **"JetBlue in-flight entertainment**

Movies and TV JetBlue can have a more limited movie selection than other airlines. The movie selection is different for outbound and inbound flights and changes every month. The TV selection, on the other hand, is much more diverse, with as many as 100 channels of live TV from DirecTV on certain aircraft with seatback screens. JetBlue also has The Hub for people to access content on their personal devices. Flyers connect to the Wi-Fi and then can access all sorts of free content including shows and movies, magazines and e-books. Through a partnership with Amazon, people can also stream Amazon Prime videos for free with the onboard Wi-Fi via the Amazon app. JetBlue TrueBlue loyalty members can earn 3 TrueBlue points for every $1 spent while shopping on Amazon.com during the flight. Music Every seat on JetBlue flights is enabled with SiriusXM radio. Passengers can listen to more than 100 channels of music and talk radio. Wi-Fi JetBlue's FlyFi is free for all customers and there are no restrictions on streaming. Upcoming partnership with Peacock In Spring 2023, JetBlue will add to its in-flight offerings via a partnership with Peacock, NBCUniversal's streaming service. Through the partnership, flyers will be able to watch select Peacock originals on their seatback screens and will be able to stream Peacock's full library on devices while connected to in-flight Wi-Fi. TrueBlue loyalty program members will be eligible for special offers on Peacock, including a complimentary one-year Peacock Premium subscription for TrueBlue Mosaic status holders and the chance to earn points by subscribing." (Nerdwallet , 2023)

vii. **"Alaska Airlines in-flight entertainment**

Movies and TV Alaska Airlines offers the ability to watch TV shows and movies with your personal devices on nearly all its flights. To do so, you'll want to navigate to the onboard Wi-Fi once you've boarded your flight. » Learn more: The complete guide to Alaska Airlines Mileage Plan Wi-Fi Most Alaska planes currently have satellite Wi-Fi installed and available for use. Wi-Fi costs $8 for the duration of your flight. There are also monthly and annual passes available. Alaska Airlines also offers free in-flight texting. Passengers can connect to the Wi-Fi and send messages via iMessage, Facebook Messenger and WhatsApp without charge. » Learn more: How to send and receive text messages on a flight Frontier in-flight entertainment Frontier Airlines currently doesn't offer Wi-Fi or other in-flight entertainment options. Spirit in-flight entertainment The majority of the Spirit Airlines fleet offers inflight Wi-Fi. The price to connect varies from route to route and depends on which plan you choose. According to Spirit, the starting price for streaming Wi-Fi is $5.99, while message-worthy Wi-Fi begins at $2.99." (Nerdwallet , 2023)

viii. "British Airways in-flight entertainment

Movies, TV and music Passengers can watch any title from a huge catalog of movies and TV shows on the seatback screens on certain British Airways airplanes. The collection includes everything from new films to Headspace meditation programs and kids content. The airline gives passengers access to what's playing onboard and allows them to create a watchlist online before they take off. The in-flight entertainment system also has music channels and podcasts. Newspapers and magazines British Airways travelers also have access to more than 7,000 digital newspapers and magazines through the airline's partnership with PressReader. Users must download the PressReader app, and anything that they download can be kept after the flight. Wi-Fi is available on 90% of British Airways flights through the .air service provider, which gives passengers the option of purchasing in-flight Wi-Fi plans." (Nerdwallet , 2023)

ix. "Hawaiian Air in-flight entertainment

Movies and TV Hawaiian Airlines offers free in-flight entertainment to all passengers on flights across the Pacific. On the A330 planes, there are seatback screens in the main cabin and tablets in the premium cabin. On flights on Hawaiian's A321neo aircraft, travellers can stream entertainment via the Hawaiian Airlines app. Wi-Fi Hawaiian Airlines announced in early 2022 that it had partnered with Starlink to offer free, high-speed Wi-Fi on its aircraft. While this hasn't launched yet, it's in the works and Hawaiian Airlines plans to have some availability in 2023." (Nerdwallet , 2023)

x. AUDI HOLORIDE

xi. "From fall, a large number of Audi models will be holoridecapable From fall 2022, select models that roll off the line with the third generation modular infotainment toolkit (MIB 3) and the latest software cluster will be holoride-capable. These models will be ready for holoride throughout the European market as well as in Canada, the USA, Japan and China. The availability of holoride itself may deviate from this depending on the individual market. Initially, holoride will be launched in Germany and the US market. Other markets will follow successively. To use holoride, a virtual reality headset that has been enabled for it must be connected with the vehicle. "(AUDI , 2022)

xii. "Content, especially entertainment, will become a major driving force for the mobility experience of the future." Nils Wollny (AUDI , 2022)

xiii. "This is a scene from the trailer by holoride GmbH, a spin-off in which Audi Electronics Venture GmbH holds a minority interest. It mirrors a situation that a lot of parents are quite familiar with: While the driver enjoys the driving experience, everyone else perceives their travel time as time wasted. Sure, there are ways to kill time, but is time not way too precious for just being killed, really? Wouldn't it

be great if every single car ride became a unique experience for everyone in the car? The young woman grabs the Virtual Reality headset lying next to her. She puts it on and all of a sudden finds herself in the middle of a fascinating game. Now it seems as if the Audi e-tron is no longer driving past the city's grey building facades. Instead it is moving through a colorful fantasy world populated by blue and white little chickens, so it seems. As the car stops at a pedestrian crossing in the real world, the vehicle stops in the virtual reality as well and the little chickens can pass. With the controller in her right hand, the young woman can aim for the chickens and is rewarded with hit points. The fusion of the vehicle data and the game content is perfect: With each bend along the way, with each acceleration of the car and each application of the brakes, the virtual reality experience is shaped. In a similar way, the young woman is flying through a prehistoric landscape on a dinosaur and navigating a spaceship through space later on in the trailer." (AUDI , 2022)

xiv. "Audi brings stories to life in the car Extended Reality (XR) is an umbrella term for Virtual Reality (VR) and Augmented Reality (AR). With the new technology an extra dimension is added to this Extended Reality: "We took relevant data points like location, speed, steering, acceleration and braking – and matched these with artificial environments. By doing so, we not only created a perfectly motion-synchronized journey through virtual worlds, but something radically new that entertains backseat passengers in an unseen way," says Nils Wollny, co-founder and CEO of holoride. Even for a passenger who travels the same route everyday, the VR headset will provide a new experience every time. The little chickens at the pedestrian crossing might not be there anymore the next day because the car ride in the real world will also be different. This way a whole new media format emerges: elastic content" (AUDI , 2022)

7) FCC COMPLIANCE

COMPLIANCE & COMPETENCY

7.1) FCC Compliant

i. We ensure all products given to customers are Safe to use through the rigorous International Testing. All products uphold Consumer Safety standards and regulations ensuring we achieve the FCC compliance Threshold

ii. Hereby, Falcon Innovations Technology (Shezen) Co.Ltd declares that the product type RayNeo Air 2 is in compliance with Directive 2014/30/EU

iii. FCC Statement - This device has been teste and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions , may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measure:

- Reorient or relocate the receiving antenna
- Increase the separation between the device and receiver
- Connect the device into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/-TV technician for help

iv. This device complies with Part 15 of the FCC rules

v. Operation is subject to the following two conditions:
   1) This device may not cause harmful interference and
   2) This device must accept any interference received, including interference that may cause undesired operation

vi. IC Statement - This device complies with (s)/receiver(s) that comply with Innovation, Science and Economic Development. Canada’s license-exempt RSSs.

vii. Operation is subject to the following two conditions:
   1) This device may not cause harmful interference and
   2) This device must accept any interference received, including interference that may cause undesired operation

8) ICASA Compliance

i. SCHEDULE 2.1 - STANDARD TYPE APPROVAL APPLICATION FOR RADIO FREQUENCY (RF) EQUIPMENT FOR USE IN SOUTH AFRICA
ii. SCHEDULE 2.2 - STANDARD TYPE APPROVAL APPLICATION FOR TELECOMMUNICATION TERMINAL EQUIPMENT FOR USE IN SOUTH AFRICA
iii. SCHEDULE 2.3 - SIMPLIFIED TYPE APPROVAL APPLICATION FOR RADIO (RF) EQUIPMENT AND TELECOMMUNICATION TERMINAL EQUIPMENT (TTE)
iv. SCHEDULE 2.4 - PROVISIONAL TYPE APPROVAL APPLICATION FORM FOR USE IN SOUTH AFRICA

v. “In respect of government, the system is supported by multiple relations and connections with other sector departments. These relations are essential and have a high degree of influence to deliver a complete visitor experience. Examples include interaction with Department of Home Affairs (DHA) around immigration policies and customs officials at ports of entry, securing of a free and safe environment, a competency of the South African Police Service (SAPS) including the Department of Transport (DoT) in as far as aviation and road infrastructure development is concerned, the Department of Cooperative Governance and Traditional Affairs (COGTA) in relation to the support for local government / municipalities and many other relevant government departments such as the Department of Sports, Arts and Culture (DSAC), and the Department of Forestry, Fisheries and the Environment (DFFE), all of which play a crucial role to support tourism.” (DEPARTMENT OF TOURISM, 2023)

9) VENUE

“Hammanskraal an area not far from Northern Pretoria recently had an industrial injection worth 42 Million that will create much-needed employment and development for the Pretoria area at large. According to local newspaper the Pretoria North Rekord online, The Babelegi Industrial Park at the end of May 2017 opened it's doors to create employment within certain industries. Coupled with other recent developments such as The Automotive Industry Development Centre (AIDC), where R50 billion has been allocated. This is enabling the Northern regions of Pretoria to become highly regarded for industry and job creation. The project is spearheaded by the Department of trade and industry (DTI) and The Tshwane metro in a quest to develop this once neglected area. According to the Pretoria North Rekord Trade and Industry Minister Rob Davies was instrumental in the development of the project which is apart of a bigger strategy nationwide. "Davis said the R42 million project was part of the Department of Trade and Industry (the dti) revitalisation of industrial parks to attract investment to identified nodes to encourage job creation. The park has about 261 units for leasing, 188 are occupied by textile, engineering, construction, light manufacturing, warehousing and distribution companies" - https://rekordnorth.co.za This is good news for the property market at large, especially companies that have a vested interest in the industrial development within the epicenters of South Africa and the Northern regions of this significant South African city. One such company is API Property Group who have 6 listed properties available for rental in the expanse. Initiatives like this only enable the property industry to grow. Although there are only currently 6 listed properties in the area for the leading brokerage, what makes it these listings highly favourable is the variety in size and price with the cheapest coming in at a modest R9000 per month. The Babelegi Industrial Park plays host to a number of highly regarded companies including "Nestle, CIM plastic, Glencarol, Radium engineering, Babelegi worker wear and industrial supplies, Canosa ceramics, National tents and Sail SA" - the Pretoria North Rekord states. Having these kind of mega brands operating out of the vicinity only raises the profile of Pretoria North as a whole and will enable a steady amount of industrial investment and job creation for this particular Pretorian suburb. The area isn't a problem-free location and there is still need for transport infrastructure such as roads to be upgraded. That said the Tshwane Municipality is on their way to rectifying this problem. "For this financial year, the city has a budget allocation for integrated transport infrastructure to the tune of R1.1 billion split as follows: R34 million for the Wonderboom airport, R669.2 million for A Re Yeng and R375.8 million for roads". - https://rekordnorth.co.za. This was for the 2017 financial year. The budget for the 2018/2019 financial year for the same year is as follows according to the same news source it's over R870 Million will be allocated. 130 million will be allocated to water demand management, R74 million will go to replacing water pipes, R33 Million will go to the implementation of strengthening 11kv lines, 20 million will be put towards replacing sewers and R120 Million is

being allocated to bulk electrical infrastructure at the Bronkhorstspruit, Kentron and Soshanguve substations" (API Property Group , 2018)

Warehousing Benefits:

3) Strategic Location: Warehousing facilities in strategic locations can optimize distribution networks, reducing transportation costs and improving overall supply chain efficiency.
4) Storage and Inventory Management: Warehouses provide storage space for goods, allowing businesses to maintain optimal inventory levels and meet customer demands effectively.
5) Order Fulfillment: Proximity to major transportation routes enables quicker order fulfillment, reducing delivery times and improving customer satisfaction.
6) Cost Savings: Consolidating goods in a centralized warehouse can lead to economies of scale, reducing operational costs associated with storage and distribution.
7) Supply Chain Optimization: Efficient warehousing contributes to a streamlined supply chain, minimizing delays and disruptions in the movement of goods.
8) Hammanskraal is located in the Gauteng province of South Africa. Its proximity to major transportation routes, such as the N1 highway and the R101 road, can influence its appeal for warehousing and logistics:
9) N1 Highway: The N1 is a major north-south highway in South Africa, connecting cities and provinces. If Hammanskraal is situated near or has good access to the N1, it can facilitate efficient transportation of goods to various regions.
10) R101 Road: The R101 is a regional road that connects different areas within Gauteng. Depending on the specific location within Hammanskraal, proximity to the R101 can enhance local connectivity.
11) Transportation Hub: If Hammanskraal serves as a transportation hub or is well-connected to these highways, it can attract businesses looking for convenient access to national and regional markets. It's essential to consider factors such as infrastructure, road conditions, and any recent developments in transportation networks when evaluating the suitability of Hammanskraal for warehousing purposes. Local business associations or municipal authorities may have more detailed and up-to-date information specific to the area.

10) MANAGEMENT

Phemelo Sihlali

Managing Director & Operations Director

Head of Retail Customer Experience – Phemelo Sihlali is responsible for managing the Operational, Organisational and Execution of the following Departments: Retail Shop-Fitting Designing & Installation, Retail Product Inventory Supplier Selection - Logistics & Management, Customer Experience & Supplier Client Management

Phemelo, 26, is the Founder of MALLL DESIGN.

Phemelo has a 10 years accumulative experience in Graphic Designing, Branding and Product Marketing, Events Project Management and Retail Operations Management. Phemelo studied Civil Engineering at the University of Witswatersrand in 2016, after matriculating with 5 Distinctions in 2015 (91% Mathematics & Physical Science – 89% Engineering Graphics Designs & Business Studies) however not completing the Degree due to funding constraints and not qualifying for grant loans, unfortunately putting the Degree aside until a latter stage.

Phemelo has 5 years' experience in the Fashion and E-Commerce sector through the Launch of Several Clothing Collections since 2016 under the Brand "**re.creation**", which successfully launched several Clothing Collections until 2019, amassing a large millennial customer base centralised on our Social Media Platforms from Pretoria Suburbia and Johannesburg Suburbia and the Broader Guateng. Phemelo then managed **Re.creation's** pivot into Entertainment Events Organising, founding COZY which has become the 2nd most prominent Entertainment Event in Pretoria from 2018.

Phemelo Joined In City Ink – A Retail Tattoo Parlour – in August 2018 where he began working in Retail. In City Ink is a Retail Tattoo Parlour – Opposite The Reserve Bank in Pretoria CBD – which has the Largest Tattoo Parlour customer Foot-Traffic in South Africa. Phemelo managed In City Ink Retail Organisational and Operational Tasks, Bookings, Scheduling and Queries with Liwalam, while also Activating In-Store Entertainment Experiences until 2019 which drove up customer sales and engagement; making it undoubtedly the most demanded Tattoo Parlour in South Africa.

Phemelo along with Co-Founding Business Partners in early 2019, then created "Godly Drip" which was an Events Company which had several Premium Restaurant, Club & Lounge Clients. The first client being COFI Brooklyn in Brooklyn Mall, Pretoria where Phemelo & Co Managers Ran the Marketing, Customer Experience and Events that were headlined by Cassper Nyovest, AKA, Black Coffee, Nasty C, Nadia Nakai, DJ Tira, Pearl Thusi and many more major South African Celebrities. Which made COFI Brooklyn Lounge Restaurant one of

the Hottest Entertainment Venues in Guateng. Phemelo has extensive experience and knowledge in Entertainment Events Organisation since Organising an average of 4 OutDoor Events per year since 2015, Organising out door Entertainment Event experiences that amass on average 1000 people per event

Mashadi Kekane

Chief Designer Officer

In Mashadi's work as a Learning Technologist she am inspired by a quote from Benjamin Franklin which reads, "Tell me and I forget, teach me and I remember, involve me and I learn". Involvement/interactivity of the learner has become the primary focus of elearning.

Mashadi's career ambition is to be at the forefront of teaching and training technologies that are revolutionising the elearning experience through engaging, interactive and immersive learning solutions. Mashadi is eLearning Technologist with 2 years working experience. Mashadi has been responsible for the development, implementation, evaluation and quality assurance of course content and synchronous e-learning for UCT, St Stithians and Cambridge International Online High Schools. Mashadi's architectural design background has accustomed her with the design process. Mashadi is therefore able to instantly connect with the learning intensions of the Instructional Designer when she renders storyboard templates for the learners consumption on the learning management systems. Mashadi is also equipped with a high level of general IT competence, with experience in graphic development, using a web content management system, video editing, animation and strong digital media manipulation skills in order to make e-learning a multi-sensorial experience that raises a learners connection to online learning

11) MAKRO-MARKET ANALYSIS

a. Tourist Arrivals

"South Africa is considered the largest destination in the Sub-Saharan region reaching more than 10 million international tourist arrivals annually from 2016-2019 which can be seen in table 2 below. In 2021, a total of 2 255 699 tourist arrivals was recorded which was a decline of -19,5% (-546 621) compared to 2020. Implementation of interventions and enablers outlined in the TSRP are aimed at not only returning the tourism sector's performance to levels it reached prior the outbreak of COVID-19, but to also place it on a long-term sustainable growth trajectory that fully realises SA's vast and diverse tourism potential. It was expected that the interventions and enablers would together facilitate the preservation of R189 ERRP Pillars Ensuring energy security Growing the productive economy Mass public employment interventions Infrastructure investment Green economy interventions Strengthening food security 17 billion of value, help the sector to recover to its 2019 output and employment levels by 2023, as well as position the sector for long-term sustainable growth. Furthermore, the implementation of the Plan was anticipated to reduce the impact of the COVID-19 crisis on employment by125 000 jobs." (DEPARTMENT OF TOURISM, 2023)

	2015	2016	2017	2018	2019	2020	2021
Share of GDP - Relative Contribution (% whole economy)	7.0%	7.2%	6.5%	6.7%	6.4%	3.1%	3.2%

b. Contribution to Employment

"According to WTTC estimates, in 2021 the travel and tourism sector contributed about 1081,5 jobs, which was an increase of 1,9% (contributing 7,3% to total employment) compared to 1061,4 jobs (7,0 share % to the country's total employment) in 2020. The direct contribution of tourism to employment was estimated to have increased from 509 000, 000 in 2020 to 543 900, 000 in 2021 (3,7% of employment), which was a positive growth of 6,8%." (DEPARTMENT OF TOURISM, 2023)

	2015	2016	2017	2018	2019	2020	2021
Percentage Share of Employment: Relative Contribution (% whole economy)	9.1%	9.3%	8.8%	9.4%	9.3%	7.0%	7.3%

Contribution of each Sub-Sector to Tourism Output and Employment in South Africa

	Travel Distribution & Intermediaries	Transport & Related Services	Accommodation	Entertainment & Related Services	Support & Indirect Services
Contribution to Tourism Industry Output	3%	27%	16%	16%	37%
Contribution to Tourism Industry Employment	4%	34%	19%	20%	23%

Source: Statistics South Africa 2019

i. "Rise in aircraft orders and deliveries The order book of major aircraft OEM Boeing has started to improve from only 172 aircraft net orders in 2020 to 373 net orders in 2021. The new aircraft will require more IFE systems. Airbus received an order for 255 A321 neo from a US equity firm Indigo Partners in November 2021. The overall aircraft deliveries increased from 566 to 600 in 2020. According to IATA, air travel to be around 50% of the pre-pandemic level for the year 2021, which is higher than the previous year 2020. These are promising signs for the Civil Aviation industry as well as the IFEC market." (marketsandmarkets.com , 2022)

ii. "Increasing product launches of IFE hardware is expected to fuel the growth of the in-flight entertainment & connectivity market during the forecast period. The IFE hardware segment is estimated to lead the market during the forecast period, with a share of 60% in 2021. IFE hardware enables airline operators to upload, store, and transfer entertainment content on the inflight entertainment systems. Increasing product launches by companies such as Thales Group drive the growth of the segment. These products offer features such as open operating system and 4K HDR displays. Based on the product, the IFE connectivity segment is estimated to have the second highest CAGR during the forecast period Based on the product, the IFE connectivity segment is estimated to lead the In-flight Entertainment & Connectivity market from 2021 to 2026. The connectivity segment is driven by the growing

demand for reliable connectivity during air travel. Passengers increasingly rely on inflight Wi-Fi for work and entertainment, prompting airlines to invest in advanced IFEC systems to improve the passenger experience. Consequently, the connectivity sector in the IFEC market is experiencing substantial growth to meet passenger expectations and industry requirements." (marketsandmarkets.com , 2022)

iii. "The first class segment is projected to witness the highest CAGR during the forecast period. Based on class, the first class segment is projected to be the highest CAGR rate for the in-flight entertainment & connectivity market during the forecast period. The demand for in-flight comfort and premium services laid the foundation for first class segment. It is the most premium of all the segments. The services start even before the actual flight with transfer from hotels, private check in, premium lounge access. In-flight, the firstclass seats are more comfortable and spacious with high quality. Based on the class, the business class segment is estimated to have the second highest CAGR during the forecast period Based on the class, the business class segment is estimated to lead the In-flight Entertainment & Connectivity market from 2021 to 2026. "(marketsandmarkets.com , 2022)

iv. "The Business Class segment in the In-Flight Entertainment & Connectivity (IFEC) market is flourishing thanks to the rising demand for premium passenger services. Airlines are strategically investing in advanced IFEC solutions to enhance the in-flight experience for business travellers. This commitment to superior connectivity and top-tier entertainment is a pivotal strategy for airlines in attracting and retaining their business-class clientele. The convergence of seamless connectivity, customized content, and tailored services plays a pivotal role in propelling growth within this segment. The narrow body aircraft segment is projected to witness the highest CAGR during the forecast period. Based on the aircraft type, the narrow body aircraft segment is projected to grow at the highest CAGR rate for the in-flight entertainment & connectivity market during the forecast period. In countries such as India, Japan, Australia, China, the US, and Russia, the demand for domestic air travel has been increasing over the years. According to IATA, in 2019, international air passenger traffic increased 4.1% compared to 2018. Due to the increase in air travel, the demand for narrow body aircraft is expected to grow across the world." (marketsandmarkets.com , 2022)

v. "Based on the aircraft type, the wide body aircraft segment is estimated to have the second highest CAGR during the forecast period Based on the aircraft type, the wide body aircraft segment is estimated to lead the In-flight Entertainment & Connectivity market from 2021 to 2026. The wide-body aircraft segment within the In-Flight Entertainment & Connectivity (IFEC) market is being driven by the growing prevalence of long-haul routes. Airlines are expanding their fleets of wide-body planes to meet the global demand for extended travel. In response, IFEC systems are being upgraded to ensure a seamless and satisfying inflight experience. The need for extensive content libraries and high-speed connectivity on these extended flights is fueling the growth of IFEC services in the wide-body aircraft sector. "(marketsandmarkets.com , 2022)

vi. "The OEM segment is projected to witness the highest CAGR during the forecast period Based on end user, the OEM segment is projected to grow at the highest CAGR rate for the in-flight entertainment & connectivity market during the forecast period. The new airlines focus on pre-installed inflight system provided by manufacturers. The increase demand of Low-cost carrier can also be seen the southeast Asian region. With the increase in number of passengers aided by the increase in number of aircrafts around the world. The demand of in-flight entertainment has also picked up pace. Based on the end user, the aftermarket segment is estimated to have the second highest CAGR during the forecast period Based on the end user, the aftermarket segment is estimated to lead the In-flight Entertainment & Connectivity market from 2021 to 2026. "(marketsandmarkets.com , 2022)

vii. "The aftermarket segment in the In-Flight Entertainment & Connectivity (IFEC) market is fueled by several essential factors. Airlines are actively pursuing cost-effective upgrades for their existing fleets, which is increasing the demand for aftermarket IFEC solutions. Furthermore, technological advancements and evolving passenger expectations for a seamless inflight experience are driving airlines to retrofit older aircraft with state-of-the-art IFEC systems. This surge in aftermarket demand is rooted in the imperative to maintain competitiveness, enhance passenger satisfaction, and extend the operational life of current aircraft while effectively managing costs." (marketsandmarkets.com , 2022)

viii. "The North American market is projected to contribute the largest share from 2021 to 2026 In-flight entertainment & connectivity market in North America is projected to hold the highest market share during the forecast period. North America accounted for the largest share of 50.0% of the in-flight entertainment & connectivity market and is expected to grow at a CAGR of 5.7% during the forecast period. The presence of major in-flight entertainment & connectivity manufacturers like Viasat, Inc., Astronics Corporation ridium Communications Inc. and Gogo LLC is one of the major reasons for the growth." (marketsandmarkets.com , 2022)

ix. "Based on the region, the Middle East region is estimated to have the second highest CAGR during the forecast period Based on the region, the Middle East region is estimated to lead the In-flight Entertainment & Connectivity market from 2021 to 2026. The Middle East region is experiencing significant growth in the In-Flight Entertainment & Connectivity (IFEC) market. A thriving aviation industry, driven by both domestic and international travel, is generating robust demand for IFEC services. Middle Eastern airlines are prioritizing toptier passenger experiences, necessitating advanced IFEC systems. Furthermore, the region's strategic location as a global travel hub underscores the critical role of excellent connectivity. In a competitive market, the Middle East is leading by investing in state-of-the-art IFEC solutions to meet the evolving demands of travellers."

x. "According to the International Air Transport Association (IATA), job losses in Africa's aviation and related industries was projected to reach 3.5 million. This was more than half of the region's 6.2 million aviation-related employment. Furthermore, GDP supported by aviation in the region, was anticipated to decrease by up to $35

billion. Full-year 2020 traffic was expected to plummet by 54% (more than 80 million passenger journeys) compared to 2019. It was anticipated that GDP supported by aviation in the region, could decrease by up to $35 billion. An online survey conducted in October 2020 showed that 92% of tourism businesses surveyed reported a more than 50% decline in revenues compared to October 2019, and 36% of businesses indicated a total loss of revenue. With regards to forward bookings, 78% of businesses reported forward bookings held in October 27 2020 are at least 50% less than bookings held in October 2019, and 23% have no bookings." (DEPARTMENT OF TOURISM, 2023)

xi. "On occupancy/customer use, 88% of businesses surveyed indicated that occupancy in October 2020 was down more than 50% compared to October 2019, and 38% indicated no occupancy. With regards to costs, 58% of businesses were unable to service their debts; 61% were unable to cover fixed costs, 58% have reduced wages for more than 50% of staff, with 40% of businesses having reduced wages for all staff; 28% of businesses have furloughed more than 50% of staff, and 12% of businesses have furloughed all staff with 33% of businesses only having furloughed less than 10% of staff; 18% of businesses had made more than 50% of staff redundant, 7% had made all staff redundant, with 33% not making any redundancies. The survey also found that 23% of responding businesses were not operating in October 2020, but plan to reopen with 5% of businesses indicating they are closed and will not reopen. Though, signs of recovery have been reported in all tourism indicators, sustained efforts to support growth in domestic tourism, implementing a world class e-visa system, addressing the electricity crisis and developing a more resilient tourism sector, among other key interventions must be maintained in order to grow the sector. The Tourism Sector Masterplan therefore presents the key issues to be addressed to facilitate full recovery and a growth trajectory going forward." (DEPARTMENT OF TOURISM, 2023)

xii. "Panasonic Avionics has received a lot of attention for Astrova, the company's impressive new modular inflight entertainment system which enables in-cabin upgrades throughout its life cycle and boasts 4K OLED screens. But the forthcoming debut of Astrova also signals Panasonic's growing prominence in in-seat power, as its own USB-C charging is a key part of Astrova. The solution, which is capable of providing a guaranteed 67 watts of direct current (DC) charging output and the ability to offer up to 100 watts of power, was developed in-house, confirms Andrew Masson, who serves as VP product management, portfolio management and marketing at Panasonic Avionics. "It's our system. It's our power," he says. and represents a stronger push "more into the DC area". This push, coupled with Panasonic's decision to add a USB-C port as part of the swappable peripheral bar on Astrova seatback IFE, is timely. Under European Union law, USB-C will become a legally mandated common port for small devices in 2024 and for laptops in 2026. "It will no longer be necessary to buy a different charger every time you purchase a new mobile phone or similar device: all of them can be recharged using the same charger," the EU announced in fall 2022. "Having a common charger will improve consumer convenience by harmonising charging interfaces and fast charging

technology, and will significantly reduce electronic waste." The so-called common charger law "helps an awful lot because it means all these devices like your cell phone, your tablet, and your laptop are all moving towards USB-C", says Masson. But it also signals a broader shift. If you buy a new home, the socket in the wall might have USB-A and USB-C ports, he notes. "It's becoming more and more prolific throughout everyone's life." And those expectations don't end on the ground." (Runaway Girl Network , 2023)

xiii. "AR Smart Glasses: AR smart glasses are a high-end, futuristic wearable accessory designed to offer precision AR experiences. Google Glass was one of the first products to beta this tech about a decade ago and although the product was a complete flop, much of its cutting-edge tech lives on. The next-generation wearable AR Smart Glasses come with a higher price tag, these devices serve as versatile tools for various industries, including retail. Companies such as Xreal, RealWear, Magic Leap, Lenovo, and others are developing AR smart glasses, enabling functions like file sharing, video conferencing, equipment repair, training, and even medical procedures. All this is super exciting, but unless there is a major breakthrough on the form factor front, in retail, this will likely be a technology used more on the B2B side, such as for warehouse management and logistics. "(Arick Wierson , 2023)

xiv. "While AR holds great promise for the retail sector, it is not without its challenges. The success ofAR hinges on the execution of the experience. And to date, it's that clunkiness that has held it back from going mainstream more quickly. Confusing or poorly executed AR – particularly if it's the first interaction someone has with the tech – can lead to a loss of interest or even deter consumers from further engagement. But make no mistake, AR is coming. In a world where technology reigns supreme, AR stands as a knight in shining armor for the retail industry. Its ability to blend digital and real-world experiences will continue to transform shopping into a smarter, more immersive, and, frankly, cooler endeavor. Whether consumers are trying on clothes virtually from their homes, exploring a digital furniture store, or experimenting with new shades of blush, AR has the ability to accompany them along every critical point in their shopping adventure, making each experience more exhilarating than ever before. Retailers are poised to capitalize on AR's potential, leveraging its capabilities to enhance customer engagement and transform the shopping landscape. As AR continues to evolve and integrate with everyday life, the future of retail looks set to be a dynamic, engaging, and immersive journey. To paraphrase Colorado Buffaloes' phenom and cultural zeitgeist of the moment, head coach Deion Sanders aka Coach Prime, 'AR Coming.' (https://www.fox4news.com/sports/deion-sanderscolorado-coach-prime-book)" (Arick Wierson , 2023)

xv. "And Multichoice's Showmax. African streaming platforms have tailored themselves to African viewers with local content to compete with services that boast an established global footprint. In March 2023, Multichoice announced that it would be creating a new Showmax group of which it would own 70% stake with the remaining 30% held by Sky and NBCUniversalv , the partnership enables Showmax to lean on content from Sky and NBCUniversal including live football games from

the English Premier League. Showmax intents to relaunch in late 2023 and will utilize technology from NBCUniversal's Peacock streaming services. Nigeria experienced the most significant growth in OTT revenue compared to South Africa and Kenya in 2022, generating US$45.2m. Between 2016 and 2022 it has been reported that these three natipons received a collective US$175m investment into producing content, the bulk of which went towards South Africa. US$23.6m of the collective funding was invested in Nigerian entertainment, involving the production of more than 250 pieces of nationally produced video content." (PwC Africa E&M Outlook, 2023)

xvi. "A challenge for OTT companies looking to succeed in Africa will be ensuring their content is easily consumable through mobile devices given how much more abundant smartphone ownership is. OTT platforms will need to be optimized to ensure that services consume less data while also providing adequate viewing quality, Obstacles that still face OTT Africa are high price points, unstable Internet connections and a lack of Flexibility in payment options. The Internet advertising segment is a key driver of this growth both globally and in South Africa. Total South African Internet advertising revenue is set to increase at a 7.4% CAGR over the next five years. South Africa benefits from Higher Internet connectivity rates and a higher per-capita GDP than many other African markets, making it a more attractive market for advertisers, thus enabling higher advertising rate cards than Kenya and Nigeria." (PwC Africa E&M Outlook, 2023)

xvii. "Delivery service Glovo rolled out its Glovo Ads platform in Kenya in August 2023. Glovo state that the service would support "both brands and local businesses in boosting brand awareness and driving sales. It is reported that multinational companies including Coca-Cola, Barcadi, Publicis and Diageo are working with the platform. The emergence of streaming services has applied pressure to traditional TV services with many now forgoing them and paying for services that instead provide an abundant amount of on-demand video content, Services like Netflix, are appealing due to the amount of content they bring to a single place for relatively affordable subscription fee. Streaming platforms also have limited advertisements' or are completely ad-free meaning viewers can enjoy content without interruptions. Total TV Advertising revenue contracted by -3,3% in South Africa in 2022, predominantly due to falls in terrestrial TV advertising. But this will be temporary, with the segment rebounding in 2024 and increasing at 1.2% CAGR over the forecast period, Meanwhile in Nigeria and Kenya growth will be stronger with CAGRs of 6.7% and 5,4% expected respectively." (PwC Africa E&M Outlook, 2023)

9.3) SWOT ANALYSIS

1) Strengths:

i. Exclusive Content: Offering unique and exclusive content can be a significant strength, attracting airlines and passengers.
ii. Established Partnerships: Strong partnerships with airlines, content providers, and technology partners provide a competitive edge.
iii. High Entry Barriers: The need for specialized technology, licensing agreements, and capital creates barriers for new entrants.
iv. Brand Recognition: A well-established brand in the in-flight entertainment industry can enhance customer trust and loyalty.
v. Diverse Entertainment Options: Providing a wide range of entertainment options for travellers, including digital content, experiences, and travel-related information.
vi. Mobile Accessibility: Embracing mobile platforms and apps to deliver entertainment content directly to travellers' devices.
vii. Partnerships with Travel Providers: Collaborating with airlines, hotels, and travel agencies to integrate entertainment seamlessly into the travel experience.
viii. Flexibility in Content Delivery: Ability to adapt and tailor content to different travel modes and preferences.

2) Weaknesses:

i. Dependence on Airlines: The company's success is closely tied to the airline industry, making it vulnerable to economic downturns in the aviation sector.
ii. Technological Risks: Rapid advancements in technology may pose challenges in keeping the entertainment systems up-to-date and competitive.
iii. Limited Control Over Flight Experience: The company has limited control over the overall flight experience, as other factors like flight delays or service quality are beyond their influence.
iv. Reliance on External Platforms: Depending on third-party platforms for distribution may limit control over the user experience and revenue streams.
v. Competition from Non-Digital Entertainment: Traditional forms of entertainment, such as reading or conversation, could be strong competitors.
vi. Limited Physical Presence: If the company primarily operates in the digital space, it may lack a physical presence compared to competitors offering tangible experiences.

3) Opportunities:

i. Emerging Technologies: Embracing new technologies like virtual reality or personalized content recommendations can enhance the passenger experience.
ii. Global Expansion: Expanding services to international airlines and markets can open up new revenue streams.

iii. Collaborations for Exclusive Content: Partnering with content creators for exclusive in-flight entertainment options can attract more passengers.
iv. Personalized Travel Experiences: Leveraging data analytics to offer personalized entertainment recommendations based on travelers' preferences.
v. Integration with Emerging Technologies: Exploring opportunities with emerging technologies like augmented reality to enhance the travel entertainment experience.
vi. Expansion into New Travel Segments: Targeting niche markets or specific travel segments, such as business travelers or adventure enthusiasts.

4) Threats:

i. Economic Downturns: Economic challenges or downturns in the airline industry can lead to reduced demand for premium in-flight entertainment services.
ii. Intense Competition: Increased competition from other in-flight entertainment providers can erode market share and profit margins.
iii. Regulatory Challenges: Changes in aviation regulations or restrictions can impact the company's operations and growth.
iv. Technological Disruptions: Rapid changes in technology or disruptions in digital platforms may pose challenges to the delivery of entertainment services.
v. Economic Downturns: Economic uncertainties can lead to reduced travel budgets and lower demand for premium entertainment services.
vi. Regulatory Changes: Shifting regulations in the travel industry may impact the company's operations and partnerships.

9.4) SWOT ANALYSIS OF TOURISM INDUSTRY

"SWOT Analysis

1) STRENGTHS

i. Diversity of offerings (nature and wildlife tourism, scenery, adventure, beaches and coastal experiences, a variety of cultures, vibrant cities and shopping as well as business events
ii. Excellent weather
iii. Good infrastructure and facilities
iv. Large under-utilised asset base geographically spread
v. Exchange rate and affordability for international tourists

2) WEAKNESSES

i. Lack of real understanding and priority for the tourism sector by government and other economic stakeholders
ii. Poor coordination of tourism planning across government
iii. Quality of basic service delivery and infrastructure required for tourism
iv. Turn-around times in the implementation of visa regulations
v. Tour Operator Licensing delays

vi. Long haul destination and lack of direct flights
vii. Silo approach and fragmented marketing and budgets
viii. Inadequate trust and collaboration between private and public sectors
ix. Poor information availability (timing, quality and content)
x. Industry not sufficiently transformed
xi. Limited appetite of banking sector to fund tourism investment

3) OPPORTUNITIES

i. Still potential for growth in traditional /core markets
ii. Niche tourism (Gastronomy, Sports, Astrotourism, Township and Rural etc)
iii. Improved access for people living with a range of disabilities
iv. Extending offerings to significantly more mid-markets
v. Improved air access (more flights into South Africa)
vi. Significantly increased domestic tourism
vii. Levering the opportunities of digitalisation and the 4th industrial revolution
viii. Responsible tourism
ix. Inclusive/stakeholder tourism – where labour, communities share effectively in the benefits

4) THREATS

i. Resource constraints (water, electricity, telecoms)
ii. High levels of crime and negative perceptions of safety and security
iii. Service delivery protests
iv. Climate change impacts
v. Disease outbreaks
vi. Global terrorism and war incidents
vii. High and increasing degrees of competition especially from other African destinations"

(DEPARTMENT OF TOURISM, 2023)

9.5) PORTERS FIVE FORCES

In-Flight Entertainment Company:

ix. Threat of New Entrants:

- Low: Barriers to entry could be high due to the need for specialized content licensing, partnerships with airlines, and significant initial capital investment.
- Low to Medium: Depending on the specific niche within travel entertainment, barriers could vary. Entry might be easier in some segments (e.g., travel apps) but more challenging in others (e.g., exclusive partnerships for unique experiences).

x. Bargaining Power of Buyers (Airlines):

- Medium to High: Airlines may have significant bargaining power, as they can choose from various in-flight entertainment providers. However, if the company offers unique or exclusive content, this power could be reduced.

i. Bargaining Power of Suppliers (Content Providers):

- Medium: Content providers might have some bargaining power, especially if they offer exclusive or popular content. However, there may be multiple content providers to choose from.

i. Bargaining Power of Buyers (Travelers):

- Medium: Travelers have various options for entertainment during their journeys, so the power could be moderate. However, if the company provides unique and appealing content or experiences, this power could decrease.

i. Bargaining Power of Suppliers (Content or Experience Providers):

- Medium: Suppliers may have some power, especially if they offer exclusive or sought-after content or experiences. However, multiple suppliers could exist in the market.

xi. Threat of Substitutes:

- Low: In-flight entertainment systems are a unique and specific service for airlines. While passengers can bring their devices, the in-flight system provides a distinct experience.
- Medium: Depending on the type of travel entertainment, there could be substitutes, such as reading, personal devices, or other non-digital forms of entertainment.

xii. Intensity of Competitive Rivalry:

- Medium to High: Competition among in-flight entertainment providers could be intense, especially if there are several players offering similar services to airlines.
- Medium to High: Competition could be intense, particularly if the travel entertainment market is crowded with various providers offering similar services.

10. FINANCIAL MODEL

10.1) CAPITAL EXPENDITURE

WAREHOUSE	QUANTITY	COST	TOTAL
Racking - End Frames 3000x900	15	R923,00	R13 845,00
Racking - Floor Anchors M10x90	30	R8,00	R240,00
Racking - Beams 2700 (1000kg Level	72	R325,00	R23 400,00
Row Spacers 300mm	5	R40,00	R200,00
Safety Pins	140	R1.90	R140,00
Timber Decks 1350 x 900	72	R198,00	R14 256,00
Pallet Stacker	2	R9 450,00	R18 900,00
Delivery and Install	1	R3 450,00	R3 450,00
Total	**337**	**R14 394,00**	**R74 431,00**

SMART SPECS EQUIPMENT	QUANTITY	COST	TOTAL
SMART SPECS - RayNeo Air x2	50	R6 600,00	R330 000,00
Mirascreen Portable Adapter (USB-C)	15	R925,00	R13 875,00
APPLE iPHONE 15	35	R21 777	R762 195,00
iCare Plus Protection Plan for iPhone	35	R1 999	R69 965,00
Satechi 2-in-1 Headphone Stand Wireless Charger	35	R1 499	R52 465,00
Moov USC-C to Lightning 2m Cable	35	R399	R13 965,00
Anker PowerLine III USB-C to USB-C 1.8m Cable – Black	35	R199	R6 965,00
Snug 20 000mAh LED Digital 2PD Power Bank	35	R549	R19 215,00
Apple USB Power Adapter 12 Watt	35	R449	R15 715,00
Moov 6-in-1 Multiport Hub Adapter	35	R799	R27 965,00
YOSHINO SOLID STATE BATTERY (660W / 602Wh)	1	R12 931	R12 931,00
Total	**346**	**R48 126,00**	**R1 325 256,00**

SUPPLYCHAIN SURVEILLANCE	QUANTITY	COST	TOTAL
Surveillance Sensor Camera	10	R6 600,00	R66 000,00
Installation	5	R1 778,00	R8 890,00
Total	**5**	**R1 778,00**	**R17 780,00**

COMPLIANCE	QUANTITY	COST	TOTAL
Certificate of Compliance	5	R12 000,00	R60 000,00
ADVERTISING PERMIT	50	R3 000,00	R150 000,00
Total	**55**	**R15 000,00**	**R210 000,00**

SHIPPING	QUANTITY	COST	TOTAL
TCL SMART SPECS	1		R10 070,00
Total	**1**	**R0,00**	**R10 070,00**

10.2) OPERATIONAL EXPENDITURE

WAREHOUSE RENTAL	QUANTITY	COST	TOTAL
Rent	1	R10 000,00	R10 000,00
Electricity (Cent per kW)	13147	R0,16	R2 116,67
Gas (L)	1	R600,00	R600,00
Water and sewer (L)	1	R2 000,00	R2 000,00
Wifi-Fibre - Vumatel 50Mbps	Uncapped	R727,00	R727,00
Total	**13150**	**R13 327,16**	**R15 443,67**

TRANSPORTATION	QUANTITY	COST	TOTAL
Bus/taxi fare	6	R3 000,00	R18 000,00
Insurance	1	R1 070,00	R1 070,00
Fuel	300	R25,00	R7 500,00
Maintenance	1		R1,00
Total	**308**	**R4 095,00**	**R26 571,00**

INSURANCE	QUANTITY	COST	TOTAL
Storage - Electronic Equipment - Accidental damage	1	R1 070,00	R1 070,00
Goods in Transit - Logistics	1	R1 070,00	R1 070,00
Electrionic Installations - Public Liability	1	R1 070,00	R1 070,00
Electronic Equipment Asset on Customer Property	1	R1 070,00	R1 070,00
Total	**4**	**R4 280,00**	**R4 280,00**

SALARIES	QUANTITY	COST	TOTAL
ELECTRONIC MANAGER	1	R4 107,00	R4 107,00
MARKETING & ADVERTISING MANAGER	1	R4 107,00	R4 107,00
CUSTOMER MANAGER	1	R4 107,00	R4 107,00
ADMINISTRATION & OPERATIONS MANAGER	1	R4 107,00	R4 107,00
BOOKEEPING MANAGER	1	R4 107,00	R4 107,00
MANAGING DIRECTOR	1	R6 147,00	R6 147,00
Total	**6**	**R26 682,00**	**R26 682,00**

SUPPLYCHAIN SURVEILLANCE	QUANTITY	COST	TOTAL
Microsoft Dynamics 365 modules			
Asset Management	1	R1 778,00	R1 778,00
Budgeting	1	R1 778,00	R1 778,00
Cash and Bank Management	1	R1 778,00	R1 778,00
Cost Management	1	R1 778,00	R1 778,00
Demand Forecasting	1	R1 778,00	R1 778,00
Fixed Assets	1	R1 778,00	R1 778,00
General Ledger	1	R1 778,00	R1 778,00
Landed Costs	1	R1 778,00	R1 778,00
Procurement and Sourcing	1	R1 778,00	R1 778,00
Production Control	1	R1 778,00	R1 778,00
Purchase Ledger	1	R1 778,00	R1 778,00
Sales and Marketing	1	R1 778,00	R1 778,00
Sales Ledger	1	R1 778,00	R1 778,00
Warehouse Management	1	R1 778,00	R1 778,00
Warehouse Management (Advanced)	1	R1 778,00	R1 778,00
SECURA	1	R25 000,00	R25 000,00
Total	**16**	**R51 670,00**	**R51 670,00**

10.3) REVENUE MODEL

SMART SPECS AS A TRAVEL SERVICE

SUBSCRIPTION CUSTOMER	QUANTITY	PRICE	TOTAL
RayNeo Air x2 Full Set	35	R4 200	R147 000,00
RayNeo Air x2 Only –	15	R714	R10 710,00
Total	**50**	**R4 914**	**R157 710**

ADVERTISING CUSTOMER	QUANTITY	PRICE	TOTAL
201inch Programmatic Screen - Brand 1	35	R14 141	R494 935
Total	**35**	**R14 141**	**R494 935**

ENTERTAINMENT CUSTOMER	QUANTITY	PRICE	TOTAL
201inch Movie Screening	35	R1 485	R51 975
201inch Series Screening	35	R1 485	R51 975
201inch Video Screening	35	R1 485	R51 975
Total	**105**	**R4 455**	**R155 925**

APPLICATIONS CUSTOMER	QUANTITY	PRICE	TOTAL
Percent Application Revenue	35	R0,140	R5
Total	**35**	**R0,140**	**R5**

TOTAL MONTHLY REVENUE			**R808 575**

MALLL DESIGN™

SMART RETAIL TECHNOLOGY

SMART SUSTAINABLE SUPPLY CHAIN

AMPLIFI PROPERTY
SMART RETAIL
TSATSI TIME

Connecting Digital Light into Property Reality
STAY SHINING

1) Customer Market

2) Smart Sustainable Supply Chain is technology that ensures businesses supply chains have embedded electronic devices that enable them to power up their operations and have an accurate and real-time overview of their entire business operations. Electronic devices are embedded into the properties of businesses, which amplifies the property and built environment asset. We believe that it amplifies property by connecting digital light into the architecture.

3.1) Smart Sustainable Supply Chain is technology products and services that are differentiated from the competition by their focus on supply-chain intelligence. Smart Sustainable Supply Chain is technology products that are designed to use renewable energy backup power. The company's supply-chain intelligence services provide businesses with real-time data on their business operation, which can help them identify areas where they can save money.

3.2) "Revenue in the Supply Chain Management Software market is projected to reach R1.348 BILLION in 2023. Revenue is expected to show an annual growth rate (CAGR 2023-2028) of 3.55%, resulting in a market volume of R1.605 BILLION by 2028. The average Spend per Employee in the Supply Chain Management Software market is projected to reach R54.91 in 2023. In global comparison, most revenue will be generated in the United States (US$9,858m in 2023). The supply chain sector in South Africa is worth an estimated R231.9 billion (USD 13.64 billion) in 2020. This represents 9.3% of the country's GDP. The sector is expected to grow at a CAGR of 4.9% from 2021 to 2027, reaching R310.9 billion (USD 17.17 billion) by 2027." https://www.statista.com/outlook/tmo/software/enterprise-software/supply-chain-management-software/south-africa

3.3) The supply chain sector in South Africa is a major employer, providing jobs for over 1 million people. The following are some of the key challenges facing the supply chain sector in South Africa: The high cost of logistics. The lack of infrastructure, such as roads and ports. The skills shortage. The high levels of crime and corruption. Despite these challenges, the supply chain sector in South Africa is well-positioned for growth in the coming years. The sector is benefiting from the country's strategic location, its skilled workforce, and its commitment to improving its infrastructure.

1.1.1) Embedded Surveillance Advanced Environment Sensors

i. Surveillance sensors can significantly improve security in various applications by providing accurate and reliable distance measurements using sensor technology. Here are some ways how Surveillance sensors can improve security:

ii. Intrusion Detection: Surveillance sensors can be used for perimeter security and intrusion detection. By emitting laser beams and measuring the time it takes for the sensor to bounce back, Surveillance sensors can accurately detect the presence of objects or individuals in a defined area. This can be used to detect intruders attempting to breach a secured perimeter, triggering alarms or alerts for immediate response.

iii. Object Tracking: Surveillance sensors can track moving objects in real-time with high accuracy. This can be used in security applications such as tracking suspicious vehicles, individuals, or objects within a secured area. Surveillance sensors can provide precise position and velocity information, enabling security personnel to monitor and respond to potential threats effectively.

iv. Biometric Identification: Surveillance sensors can capture high-resolution 3D images of human faces or other body parts, which can be used for biometric identification. This can enhance security in access control systems, allowing for reliable identification and verification of individuals based on their unique biometric characteristics, even in low-light or adverse weather conditions.

v. Mapping and Navigation: Surveillance sensors can create detailed 3D maps of indoor or outdoor environments, which can be used for navigation and situational awareness. In security applications, these maps can provide valuable information about the layout of a facility, the location of potential security risks, and the movement of people or objects in real-time, aiding in security planning and response.

vi. Obstacle Avoidance: Surveillance sensors can be used in autonomous security robots or drones to detect obstacles in their path and avoid collisions. This can improve the safety and effectiveness of security patrols in complex or dynamic environments, where human intervention may be limited or not feasible.

1.1) Installation Guide Supply-Chain Intelligence

Installation guide for AI Surveillance sensors in warehouse and logistics assets:

1.3.1) Planning the installation on site.

i. This includes determining the number and placement of sensors, as well as the power and networking requirements. We also importantly consider the environment in which the sensors are installed, as well as any safety regulations that may apply.
ii. The sensors should be placed in areas where they can get a clear view of the assets that need to be monitored.

1.3.2) Installing the Sensors on Site.

i. This requires drilling holes in walls or ceilings, and running cables.
ii. Manufacturer's instructions are carefully followed to ensure that the sensors are installed correctly.
iii. The sensors are powered by a reliable back up battery source of electricity.

1.3.3) Configuring the Sensors on Site.

i. This involves setting up the sensors to collect the desired data and to transmit it to the AI system.
ii. The specific configuration steps depend on the Manufacturer of the Sensor and the AI system.
iii. The sensors is connected to a network that can transmit the data to the AI system.

1.3.4) Testing the System on Site.

i. Once the sensors are installed and configured, it is important to test the system to make sure that it is working properly.
ii. This involve running a simulation or collecting real-world data.
iii. The sensors are regularly monitored to ensure that they are working properly.
iv. The sensors are mounted in a secure location to prevent vandalism or tampering.

3) OPERATION

SUPPLY-CHAIN INTELLIGENCE SERVICE

Our Goal with **Supply Chain Intelligence** is to connect Digital Light into the Entire Supply Chain Operation, from

i. How Business' Clients Products move from Port,
ii. Courier Vehicle, Last Mile Delivery;
iii. Warehouse Storage, Warehouse Dispatch System;
iv. Human Resource Productivity, Health & Safety;
v. Asset Productivity Tracking & Safety;
vi. Operational Site Productivity, Health & Safety Intelligence
vii. Property Security
viii. Making the Digital Light a useful commodity by Transforming the Surveillance data into Real-Time, Accurate, Artificial Intelligence processed Business Intelligence

Asset Real-Time & Accurate Artificial Intelligence
1. We install the state of the art Surveillance equipment: i. Surveillance Sensors **ii.** Back-Up Power
2. At the Property of a Business Client, with i. Competency Certificate & **ii.** Municipal Permits
3. Real-Time Asset: i. Unique Asset Tracking ii. Quantifying Assets iii. Productivity Safety in integration with SAMTRAC Occupational Data iv. Occupational Health and Safety in integration with SAMTRAC Occupational Data v. Business Intelligence Reporting in integration with Bloomberg Business Intelligence Data vi. Microsoft Vision Studio A.I to provide Over Sight Intelligence
4. Customers have access to a Native Application Giving them full Oversight of Their Supply Chain Operation

a. Security Real-Time & Accurate Artificial Intelligence

1. **Real-Time Assert:**

i. Asset Tracking
ii. Security Alerts
iii. SECURA Security Guard Response
iv. Occupational Health and Safety in integration with SAMTRAC Occupational Data
v. Microsoft Vision Studio A.I to provide Over Sight Intelligence

b. Inventory Real-Time & Accurate Artificial Intelligence

1. **Real-Time Inventory:**

i. Unique Inventory Tracking & Dispatch
ii. Quantifying Inventory
iii. Productivity Safety in integration with SAMTRAC Occupational Data
iv. Occupational Health and Safety in integration with SAMTRAC Occupational Data
v. Business Intelligence Reporting in integration with Bloomberg Business Intelligence Data
vi. Microsoft Vision Studio A.I to provide Over Sight Intelligence

c. Human Resource Accurate Artificial Intelligence

1. **Real-Time Human Resource:**

i. Productivity Safety in integration with SAMTRAC Occupational Data
ii. Occupational Health and Safety in integration with SAMTRAC Occupational Data
iii. Business Intelligence Reporting in integration with Bloomberg Business Intelligence Data
iv. Microsoft Vision Studio A.I to provide Over Sight Intelligence

d. Operational Site Management Real-Time & Accurate Artificial Intelligence

1. **Real-Time Working Site:**

i. Productivity Safety in integration with SAMTRAC Occupational Data
ii. Occupational Health and Safety in integration with SAMTRAC Occupational Data
iii. Business Intelligence Reporting in integration with Bloomberg Business Intelligence Data
iv. Microsoft Vision Studio A.I to provide Over Sight Intelligence

i. Sustainability: AI is used to reduce waste, improve efficiency, and optimize transportation. This helps businesses to meet their sustainability goals and to reduce their environmental impact.
ii. As AI technology continues to develop, we can expect to see even more innovative applications of AI in this field.

SUPPLY-CHAIN INTELLIGENCE SERVICE

i. OPERATION

Our Goal with **Supply Chain Intelligence** is to connect Digital Light into the Entire Supply Chain Operation, from

i. How Business' Clients Products move from Port,
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iv. Human Resource Productivity, Health & Safety;
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vii. Property Security
viii. Making the Digital Light a useful commodity by Transforming the Surveillance data into Real-Time, Accurate, Artificial Intelligence processed Business Intelligence

Application and Installation Guide Supply-Chain Intelligence

1.3.1) The regulations in South Africa that apply to the use of AI Surveillance sensors in warehouse and logistics assets:
1) The Protection of Personal Information Act (POPIA):
i. This law regulates the collection, use, and disclosure of personal information.
ii. AI Surveillance sensors collect personal information, so businesses that use these sensors must comply with POPIA.
2) The Electronic Communications and Transactions Act (ECTA):
i. This law regulates the use of electronic communications, including data collected by AI Surveillance sensors.

1.3.2) Businesses that use AI Surveillance sensors must comply with ECTA's privacy provisions.
1) The National Security Act (NSA):
i. This law regulates the use of surveillance technology by businesses and government agencies.
2) The Occupational Health and Safety Act (OHS Act):
i. This law regulates the health and safety of workers in the workplace.

ii. Businesses that use AI Surveillance sensors in a way that could pose a risk to worker safety must take steps to mitigate those risks

1.3.3) Installation guide for AI Surveillance sensors in warehouse and logistics assets:

1) Planning the installation on site.

i. This includes determining the number and placement of sensors, as well as the power and networking requirements. We also importantly consider the environment in which the sensors are installed, as well as any safety regulations that may apply.

ii. The sensors should be placed in areas where they can get a clear view of the assets that need to be monitored.

2) Installing the Sensors on Site.

i. This requires drilling holes in walls or ceilings, and running cables.

i. Manufacturer's instructions are carefully followed to ensure that the sensors are installed correctly.

ii. The sensors are powered by a reliable back up battery source of electricity.

3) Configuring the Sensors on Site.

i. This involves setting up the sensors to collect the desired data and to transmit it to the AI system.

i. The specific configuration steps depend on the Manufacturer of the Sensor and the AI system.

ii. The sensors are connected to a network that can transmit the data to the AI system.

4) Testing the System on Site.

i. Once the sensors are installed and configured, it is important to test the system to make sure that it is working properly.

iii. This involve running a simulation or collecting real-world data.

iv. The sensors are regularly monitored to ensure that they are working properly.

v. The sensors are mounted in a secure location to prevent vandalism or tampering.

2. Problem Worth Solving

PROBLEM & PAIN POINTS

"Executives continue to focus more on basic, near-term priorities and challenges in their supply chains and less on actions and investments that can help transform supply chains and create long-term value. Despite the abundance and potential of technologies, few executives say their companies are using or planning to use them to automate and enhance the execution of different areas of the supply chain over the next 24 months.
The lack of digital culture and training (58%) and insufficient talent (40%) were identified as top challenges by most companies. Lack of skills or competencies in the company's workforce was also rated as one of the biggest challenges by survey respondents when it came to making use of data analytics (66%)." **Source: PwC's, 2023 Supply Chain Survey**

3.1) The challenges existing in the supply chain industry currently in South Africa:

i. Inefficient infrastructure: South Africa's infrastructure is outdated and inefficient, which can lead to delays and disruptions in the supply chain. For example, the country's ports are congested and slow, and the road network is poorly maintained.
i. Skills shortage: There is a shortage of skilled supply chain professionals in South Africa. This can make it difficult to find qualified people to manage and implement supply chain solutions.
ii. Corruption: Corruption is a major problem in South Africa, and it can also affect the supply chain. For example, corrupt officials may demand bribes to approve shipments or facilitate clearance through customs.
iii. Unstable political environment: South Africa has a history of political instability, which can also disrupt the supply chain. For example, strikes, protests, and civil unrest can all disrupt transportation and logistics.
iv. Natural disasters: South Africa is prone to natural disasters, such as floods, droughts, and cyclones. These disasters can damage infrastructure and disrupt transportation, leading to delays and shortages.
v. Cybersecurity threats: The supply chain is increasingly vulnerable to cyberattacks. These attacks can steal sensitive data, disrupt operations, and cause financial losses.
vi. Compliance requirements: South Africa has a complex regulatory environment, which can add to the challenges of managing the supply chain. For example, companies must comply with a variety of laws and regulations related to customs, trade, and safety.
vii. In addition to the challenges mentioned above, the COVID-19 pandemic has also had a significant impact on the supply chain industry in South Africa. The pandemic has caused widespread disruptions to transportation, logistics, and production, leading to shortages and delays.
viii. The war in Ukraine is also having a negative impact on the global supply chain, as it is disrupting trade and causing energy prices to rise.

3.2) The supply chain is a complex network of interconnected businesses, and it is essential for the efficient operation of the economy. Here are some of the specific ways in which these companies and businesses use supply chain management:

i. Planning: Supply chain managers need to plan the movement of goods and materials through the supply chain. This includes determining the best routes, the most efficient transportation methods, and the optimal inventory levels.
ii. Sourcing: Supply chain managers need to source the raw materials and components needed to produce their products. This involves finding reliable suppliers, negotiating contracts, and ensuring that the quality of the materials is up to standard.
iii. Manufacturing: Supply chain managers need to coordinate the manufacturing process to ensure that products are produced on time and within budget.
iv. This involves scheduling production runs, managing inventory, and ensuring that the quality of the products is maintained.
v. Distribution: Supply chain managers need to distribute the finished products to customers. This involves selecting the best transportation methods, managing inventory, and ensuring that the products are delivered on time and in good condition.
vi. Logistics: Supply chain managers need to manage the logistics of the supply chain. This includes warehousing, packaging, and labelling.
vii. Customer service: Supply chain managers need to provide customer service to ensure that customers are satisfied with the products and services they receive. This includes handling complaints, resolving issues, and providing information to customers.

4. Despite these challenges, the supply chain industry in South Africa is still growing. The country is a major gateway to the African continent, and it has a number of competitive advantages, such as a skilled workforce and a strategic location. Companies that are able to overcome the challenges of operating in South Africa can find a profitable market for their products and services

5. Value Proposition

SUPPLY CHAIN INTELLIGENCE

"Greater integration of data between manufacturers and customers can open up new collaboration opportunities. Clever use of pooled data, for example, can allow manufacturers in business-to-business (B2B) markets to help customers in value-chain planning, drive efficiencies within the customer's operations and vice versa. Many companies have such collaborative opportunities in sight." (PWC, 2016)

Artificial Intelligence software that processes Surveillance to create business intelligence, within supply chain management industry:

5.1) Improved efficiency and visibility: AI-powered Surveillance helps to improve the efficiency and visibility of supply chains by providing real-time data on the location, movement, and condition of goods. This information can be used to optimize routing, scheduling, and inventory management, leading to reduced costs and improved customer service.

5.2) Reduced risk: AI is also be used to identify and mitigate risks in supply chains. For example, AI is used to monitor for potential disruptions, such as weather events or cyberattacks, and to develop contingency plans. This can help to reduce the likelihood and impact of disruptions, protecting businesses from financial losses and reputational damage.

5.3) Increased compliance: AI can is used to help businesses comply with regulations. For example, AI is used to track and manage the movement of hazardous materials, or to ensure that products are being transported in accordance with safety standards. This can help businesses to avoid costly fines and penalties.

5.4) Enhanced decision-making: AI is used to provide businesses with insights that can help them to make better decisions. For example, AI is used to analyse historical data to identify trends and patterns, or to predict future demand. This information can be used to make informed decisions about inventory levels, pricing, and marketing strategies.

5.5) Overall, the introduction of AI and technology into supply chain management has the potential to significantly improve the efficiency, visibility, risk management, compliance, and decision-making capabilities of businesses. This can lead to reduced costs, improved customer service, and increased competitive advantage. Here are some specific examples of how AI is being used in the supply chain management industry:

i. Amazon is using AI to track the movement of its products through its warehouses. This information is used to optimize routing and scheduling, leading to faster deliveries.

ii. Walmart is using AI to predict demand for products. This information is used to ensure that stores have the right amount of inventory on hand, reducing out-of-stocks and spoilage.

iii. UPS is using AI to identify potential disruptions in its supply chain. This information is used to develop contingency plans, such as rerouting shipments or changing delivery times.
iv. Maersk is using AI to monitor the condition of its cargo containers. This information is used to identify potential problems early on, such as leaks or damage, and to take corrective action.

5.6) These are just a few examples of how AI is being used to improve the supply chain management industry. As AI technology continues to develop, we can expect to see even more innovative and impactful applications in the years to come.

5.7) Evaluating the success of an AI technology provider in the supply chain industry:

i. The level of innovation: The company should be constantly innovating and developing new AI-powered solutions to improve the supply chain.
ii. The quality of the data: The company should have access to high-quality data that is accurate and up-to-date.
iii. The expertise of the team: The company should have a team of experienced professionals who are experts in AI and supply chain management.
iv. The scalability of the solution: The solution should be scalable so that it can be easily adapted to the needs of a growing business. By considering these factors, businesses can be more confident in choosing an AI technology provider that will help them achieve their supply chain goals.

KPIs

Key Performance Indicators (KPIs) of AI technology in the supply chain industry:

5.8) Perfect order rate: This metric measures the percentage of orders that are fulfilled correctly, on time, and in full. A high perfect order rate indicates that the AI technology is effectively optimizing the supply chain and reducing errors.

5.9) On-time delivery rate: This metric measures the percentage of orders that are delivered on time. A high on-time delivery rate indicates that the AI technology is effectively managing transportation and logistics.

5.10) Inventory turnover: This metric measures how quickly inventory is sold and replaced. A high inventory turnover rate indicates that the AI technology is helping to reduce inventory costs.

5.11) Cost per unit: This metric measures the cost of producing or acquiring each unit of product. A low cost per unit indicates that the AI technology is helping to improve efficiency and reduce costs.

5.12) Customer satisfaction: This metric measures how satisfied customers are with the overall supply chain experience. A high customer satisfaction score indicates that the AI technology is helping to improve customer service.

5.13) Reduced waste: This metric measures the amount of waste generated by the supply chain. A reduction in waste indicates that the AI technology is helping to improve sustainability.

5.14) Increased visibility: This metric measures how well the AI technology can track and monitor the supply chain. Increased visibility can help to improve efficiency and reduce risk.

5.15) Risk mitigation: This metric measures how well the AI technology can identify and mitigate risks in the supply chain. Effective risk mitigation can help to prevent disruptions and losses. These are just a few of the many KPIs that an AI technology

provider in the supply chain industry can use to measure their success. The specific KPIs that are most important will vary depending on the specific goals of the company and the challenges they are facing.

The more than 300 executives and leaders we surveyed recognize the benefits of digitizing their supply chains and have made significant commitments. (PwC's, 2023 Supply Chain Survey)

Percentage of Executives say their supply chain technology investments haven't fully delivered expected results
83%
Source: PwC's, 2023 Supply Chain Survey

Percentage of Executives say increasing resilience is a top objective when investing in supply chain technology
Only about one-third
Source: PwC's, 2023 Supply Chain Survey

With risk, Executives say their company should invest more in technology to identify, track and measure supply chain risk
· **86% agree**
· **Including 35% who strongly agree.**
Source: PwC's, 2023 Supply Chain Survey

Executives say their top priorities for the next 12-18 months are
· **increasing efficiency and**
· **managing or reducing costs,**
· **with both named much more often than several other choices.**
Source: PwC's, 2023 Supply Chain Survey

The adoption and application of technologies within supply chain operations varies greatly by technology.
· **Cloud tops the techs that have been either partially or fully adopted (84%),**
· **followed by the Internet of Things (IoT) (79%)**
· **Technologies such as scan and intelligent data capture and third-party spend analytics tools weren't far behind**
· **less than half of respondents say their companies have fully or partially adopted drones, augmented reality, or robotics or robotic process automation.**
Source: PwC's, 2023 Supply Chain Survey

Responses to planned tech investments were similar, with
· **cloud,**
· **IoT,**

· **third-party spend analytics tools, and**
· **scan and intelligent data capture**
Source: PwC's, 2023 Supply Chain Survey

But when asked about the levels of investment in the next two years,
· **Artificial Intelligence and machine learning are seeing the most spending**
· **With 22% of executives saying their companies plan to invest at least $5 million in those technologies.**
Source: PwC's, 2023 Supply Chain Survey

As for their main objectives with supply chain tech investments,
· **driving growth (53%)**
· **optimizing costs (51%)**
· **Only 17% of executives say their company's investments in supply chain technology have fully delivered the expected results. That's down from 20% in the previous survey,**
Source: PwC's, 2023 Supply Chain Survey

Once again respondents are divided as to why the results have fallen short Reasons ranged from
· **needing more time to conduct the implementation (e.g., it's still in process), cited by 21%,**
· **to undefined ownership and vision 4%**
Source: PwC's, 2023 Supply Chain Survey

What techs are used in which parts of the supply chain?

	AI and Machine Learning	**Scan and Intelligent Data Capture**	**ERP enhancements**	**Forecasting Solutions**	**IOT**	**Robotic Process Automation**
Planning	33%	32%	19%	36%	22%	23%
Sourcing	25%	28%	18%	29%	20%	17%
Making	26%	23%	21%	26%	23%	21%
Delivering	26%	27%	20%	24%	25%	19%

Source: PwC's, 2023 Supply Chain Survey

Compared to higher responses for driving growth and optimizing costs

- **Only 34% of executives say increasing resilience is a top objective when investing in supply chain technology.**
- **That also was lower than improving customer service (40%)**
- **Gaining competitive advantage (38%),**

Source: PwC's, 2023 Supply Chain Survey

Executives also generally think their existing processes and systems adequately manage risk in the supply chain,

- **with 83% agreeing or strongly agreeing with that statement**

· **At the same time, 86% agree or strongly agree that their company should invest more in technology to identify, track and measure supply chain risk.**
· **That indicates that "adequate" may not be enough as business leaders consider how else they can head off risks in the supply chain.**
Source: PwC's, 2023 Supply Chain Survey

The challenges in managing risks remain plentiful, When presented with several options
· **roughly two-thirds of respondents say all were either a major or minor challenge.**
· **Predicting future risks is at the top with 80% saying it's a major or minor challenge**
Source: PwC's, 2023 Supply Chain Survey

Is your company taking or about to take any of the following actions?

	Business & Professional Services	Manufacturing	Construction	Technology, Media, Telecommunication	Life Sciences	Consumer Business	Energy, Utilities, Mining	Financial Services
Increase use of digital (planning) tools	33%	47%	31%	29%	21%	57%	41%	42%
Stress testing/scenario testing	10%	14%	10%	15%	14%	31%	47%	32%
Increase parts and supplies inventories	33%	43%	17%	21%	29%	39%	47%	10%
Source: DELOITTE – THE CFO PROGRAMME Supply chain management insights 2023 (A special publication by Deloitte Central Europe)								

"Industrial companies that successfully implement Industry 4.0 no longer need to choose between focussing on a better top or bottom line. They can improve both at the same time. More than 70% of the respondents in South Africa are expecting a greater than 10% improvement in efficiency gains. Also, more than 70% are expecting an over 10% reduction in costs from operations and an over 70% improvement in additional revenue in the next five years. High levels of cost reduction are expected in every industry sector studied for this report." - PWC 2016 Global Industry 4.0 Survey – South Africa highlights

Digitisation of the existing product portfolio	· 32%
Introducing a new digital product portfolio	· **43%**
Big data analytics services to external customers	· **32%**
Other digital services to External customers	· **46%**
· Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights	

Are companies underestimating the scope of data analytics?

Increase of sales revenue	· 78%
Optimisation of overall business planning and controlling	· **68%**
Better manufacturing /operations planning	· **67%**

Improvement of customer relationship and customer intelligence along the product life cycle	· **65%**
Development of new or optimisation of existing products /services	· **63%**
Improved product or process quality	· **62%**
Efficient maintenance / service of own assets or customer products	· **55%**
Better cooperation and decision-making with partner companies	· **53%**
Optimisation of transport and logistics costs / efficiency	· **48%**
· Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights	

Industrial companies in South Africa: organisation of data analytics capabilities

Dedicated department for data analytics serving many functions across the company	· ***5%***
Data analytics is embedded within specific functions	· ***48%***
Data analytics services are outsourced and performed by external service providers	· ***4%***
Selective, ad-hoc data analytics capabilities of single employees	**32%**
No significant data analytics capabilities	· ***9%***
· Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights	

Companies all over the world are expecting to dramatically increase digitisation over the next five years
Europe, Middle East & Africa
· ***71%*** **Level of digitisation in five years**
· ***30%*** **Level of digitisation today**
Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights

According to the survey, 48% of the companies plan to invest
· **more than 8% of their annual revenues in digital programmes in the next five years, which reflects their commitment to the vision of Industry 4.0.**
· **The survey suggests that the average amount the companies are seeking to invest in the next five years is 6.8% of their annual revenue**

Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights

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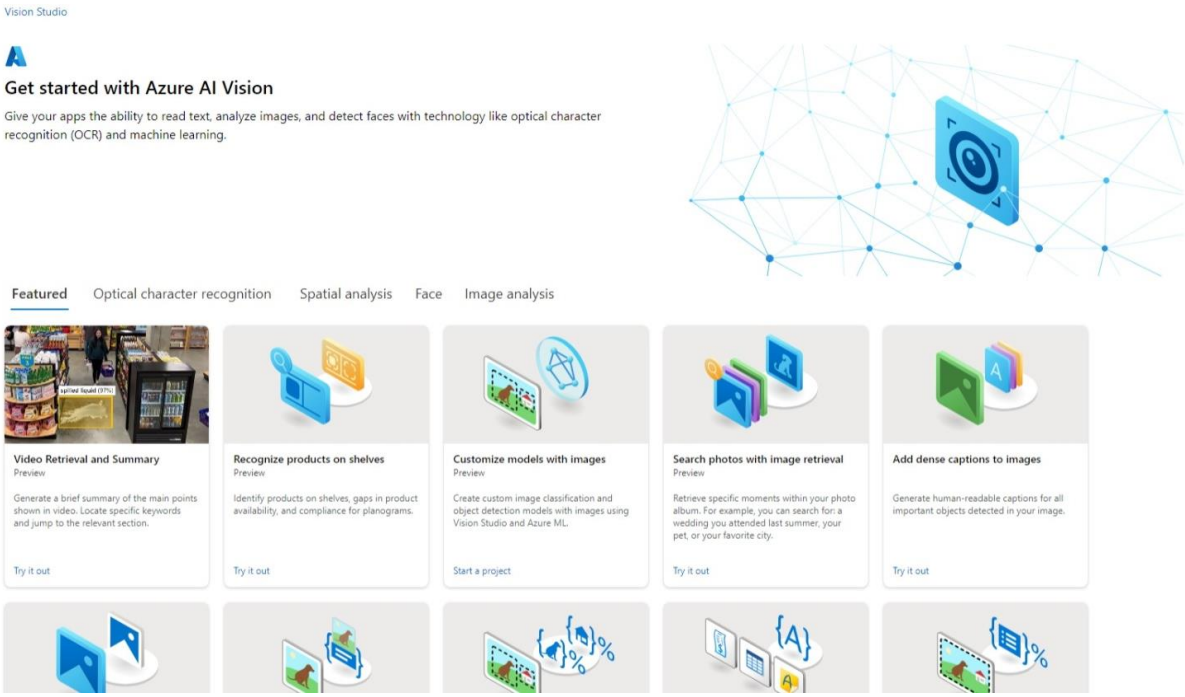
Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights

South Africa companies: most companies expect Industry 4.0 investments to pay back within two years Expected ROI on Industry 4.0 investment
· **Within two years 74%**
· **Two to five years 26%**
Source: PWC 2016 Global Industry 4.0 Survey – South Africa highlights

SMART SUPPLY CHAIN PRODUCTS



Microsoft Dynamics 365

Sensor Data Intelligence

Create a smarter factory using connected sensors to automate data collection, then harness IoT's power to produce actionable insights that help you continually improve.

Data as a strategic asset

Data is at the core of the modern enterprise. There is a competitive advantage in the ability to process raw data faster to deliver more actionable insights. Yet, as the number of Internet of Things (IoT)-connected sensors in the supply chain grows exponentially, businesses are struggling to turn the idea of digital transformation into a reality. Top performers understand that a nimble and open architecture is required to connect an ever-expanding universe of data sources and then turn this raw data into a competitive advantage.

Dynamics 365 Supply Chain Management

Sensor Data Intelligence is an add-in that integrates IoT sensors and signals with data in Supply Chain Management. Monitor goods at key points in the value chain, and use analytics to transform supply chain processes from reactive to predictive. Improve uptime, throughput, and quality by proactively managing shop floor and equipment operations with a real-time view of your entire production and stock. Simply put, sensor data intelligence powers digital transformation.

> Improve uptime, throughput, and quality by proactively managing shop floor and equipment operations with a real-time view of your entire production and stock.

Supply Chain Management

Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

Procurement and sourcing

Improve communication across the supply chain to enhance order accuracy and maximize vendor performance while optimizing the cost and quality of material and service spend.

Power the full range of procure-to-pay
Today's highly competitive marketplace has pushed the business world to create intricate, lean, and highly interdependent global supply. Smart players generate predictability, stability, and resilience by leveraging procurement and sourcing solutions that reduce material costs and increase overall profitability while enabling better and faster decision-making.

Dynamics 365 Supply Chain Management
Dynamics 365 Supply Chain Management integrates all steps of the procurement and sourcing processes through a single application. Embedded tools for spend analysis, supplier performance management, and real-time vendor collaboration provide you with the actionable intelligence needed to maximize the effectiveness of your purchasing and sourcing processes.

Dynamics 365 Supply Chain Management integrates all steps of the procurement and sourcing processes through a single application.

Supply Chain Management

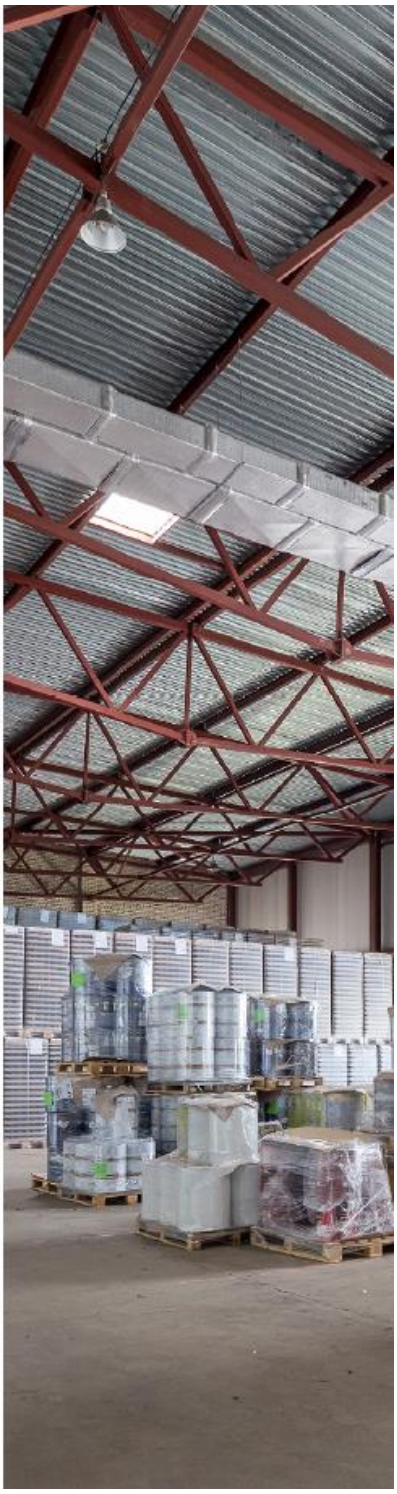


Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

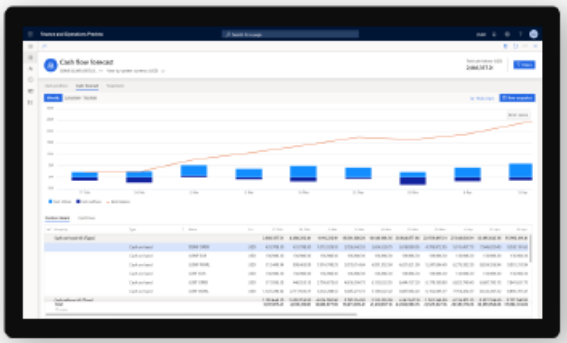
Dynamics 365 Finance

Microsoft Dynamics 365 Finance enables organizations to monitor the performance of financial operations in real-time, predict outcomes, and make data-driven decisions to drive business agility and growth. It empowers users to do business anywhere, anytime, with an intuitive user-interface personalized for their role and preferences.

"I rely on Dynamics 365 to help me make sense of complex financial histories to stay on top of complicated billing and payment processes at multiple sites."

Mark Hodkinson
Vice President of Finance for the Bel Power Solutions Group
Bel Fuse

bel



Key benefits

Enhance your financial decision making

Automate manual tasks and focus on adding value. Use real-time, global reporting, embedded analytics and predictive insights to assess the health of your business, improve financial controls, optimize cash flow and drive growth.

Unify and automate your business processes

Integrate core business processes with financials and automate standard tasks to boost user productivity, support evolving business models and maximize financial performance.

Reduce global financial complexity and risk

Quickly adapt to changing financial requirements with a rules-based chart of accounts and a no-code configuration service that simplifies regulatory and tax reporting, electronic invoicing and payments.

Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

Master planning

Plan supply and distribution throughout the day in near-real-time with in-memory services, ensuring that the right inventory is in the right place at the right time.

Balance demand and supply in real-time
Meeting customer demands is more challenging today than ever before. Businesses need to quickly adapt to changing trends to ensure the right products are available at the right time. Bridging this gap requires intelligent planning and a real-time understanding of the materials and capacities required to complete production goals. Modern manufacturers need solutions that allow them to plan strategically, streamline processes, and hit production targets on a consistent basis.

Dynamics 365 Supply Chain Management
Dynamics 365 Supply Chain Management's master planning capabilities help businesses optimize resource planning and production. Demand forecasting capabilities enable businesses to intelligently anticipate needs while planning tools help ensure they have the right resources—including raw materials, workforce, and machinery—to meet customer demands. Planning optimization allows companies to turn a 5-hour task into a 5-minute task so that production plans can be run multiple times a day, reducing total lead time, increasing production throughput, and improving customer responsiveness.

> Planning optimization allows companies to turn a 5-hour task into a 5-minute task, reducing lead time, increasing throughput, and improving responsiveness.

Supply Chain Management

Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

Demand forecasting

Improve demand forecasting by leveraging machine learning. Integrate cross-company sales and operations planning to minimize inventories and improve on-time delivery.

Improve visibility of future demand

Modern businesses require estimates of future demand because most business decisions are based on the future and require a plan. And every plan needs a forecast. However, it remains challenging for many businesses to forecast demand accurately. Organizations at the leading edge have recognized the need for a demand forecasting solution that can provide insight into the optimal forecasting technique, integrate disperse supply chain and dynamic market data, and combine it with expert knowledge from business leaders working collaboratively.

Dynamics 365 Supply Chain Management

Dynamics 365 Supply Chain Management's Demand forecasting solution leverages machine learning and AI-driven insights to improve businesses' ability to produce accurate forecasts. By integrating demand forecasting across Supply Chain Management, sales, and operations planning, organizations can avoid overstocking, increase inventory turns, and improve cash-to-cash cycle times while simultaneously ensuring high levels of on-time delivery to customers.

Dynamics 365's Demand forecasting solution leverages machine learning to produce highly-accurate forecasts.

Supply Chain Management

Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

Asset management

Maximize asset performance throughout the lifecycle by optimizing maintenance and repair operations of physical plants and equipment.

Minimize downtime and reactive maintenance

Asset management is concerned with maximizing the return-on-investment of long-term fixed assets, such as vehicles, material equipment, and process machinery. Because this equipment plays a direct role in operational output and represents large fixed-cost investments, asset-intensive businesses—including manufacturers—need to prioritize effective asset care. Smart organizations need to leverage solutions that enable them to maximize asset life, optimize performance, and minimize operational downtime and related costs.

Dynamics 365 Supply Chain Management

The Asset Management Add-in for Dynamics 365 Supply Chain Management is an advanced module for managing assets and maintenance jobs. It seamlessly connects with other Dynamics 365 business applications, including Field Service, so you can manage the lifecycle of your assets, optimize maintenance plans, and generate intelligence from IoT sensors to perform proactive maintenance, efficiently manage spare parts, and automate work orders.

> The Asset Management Add-in for Supply Chain Management is an advanced module for managing assets and maintenance jobs.

Image from www.MICROSOFT.COM CO-PILOT Product Brochure

Microsoft Dynamics 365

Cost management

Optimize costs across the supply chain by collecting, analyzing, and evaluating a wide range of comprehensive cost data to unlock deeper insights and new opportunities.

Create value through cost optimization

Simply put, cost management is about calculating and accounting the cost of a product or service; however, this modest view excludes the value-adding service that cost accounting delivers to management in the form of additional information and insights into the business. The challenge is to quickly move from collecting and calculating costs to generating actionable insights and intelligence into inventory and work in progress values that create value through continual cost optimization.

Dynamics 365 Supply Chain Management

Dynamics 365 Supply Chain Management's cost management solution gives businesses deep insights into cost performance across the value chain in near real-time. It equips cost accountants with the tools required to move from collecting cost data to providing management with actionable information and reports.

The introduction of Global inventory accounting gives businesses the ability to account inventory in multiple representations, each following a set of defined inventory accounting rules for reporting purposes like Statutory, Consolidation, or Management accounting. Additionally, inventory can be accounted in a selected secondary currency.

> Gain deep insights into cost performance across the value chain in near real-time.

Supply Chain Management

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