

# Insights into the I4.0 maturity of SA Manufacturing

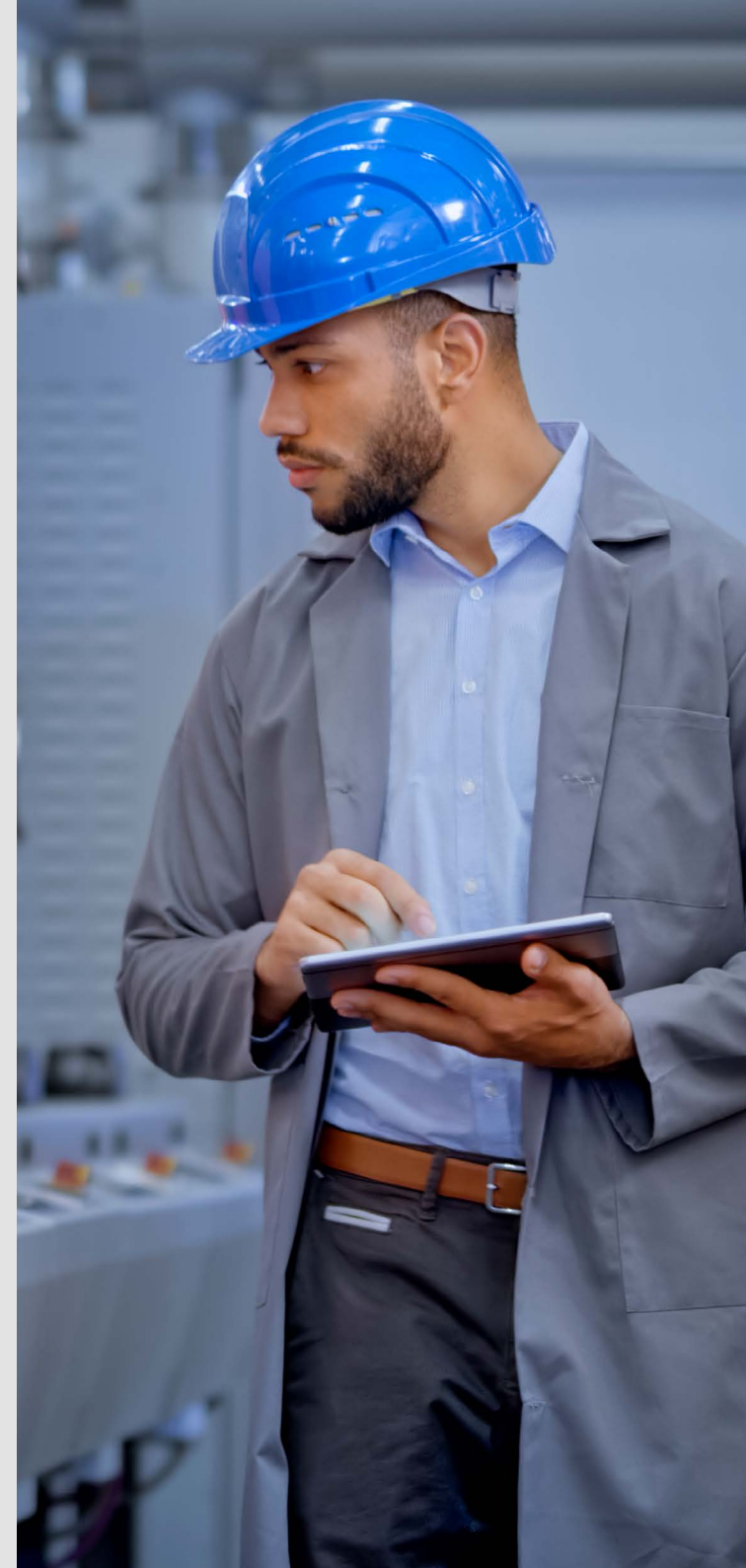
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<https://www.pwc.co.za/en/services/consulting/digital/smart-factories.html>

# Contents

<b>Glossary of terms</b>	<b>1</b>
<b>4IR landscape in South Africa</b>	<b>2</b>
<b>This research study</b>	<b>3</b>
<b>Snapshot: What does the data say?</b>	<b>4</b>
<b>Study insights</b>	<b>6</b>
Insight 1: The leaders behind the 4IR agenda	<b>6</b>
Insight 2: Uncertain returns	<b>8</b>
Insight 3: Data driven decision-making	<b>11</b>
Insight 4: Degree of 4IR implementation	<b>13</b>
Insight 5: A 4IR workforce	<b>14</b>
Insight 6: Challenges of implementation	<b>16</b>
Leaders or Followers?	<b>17</b>
<b>References</b>	<b>19</b>



# Glossary of terms

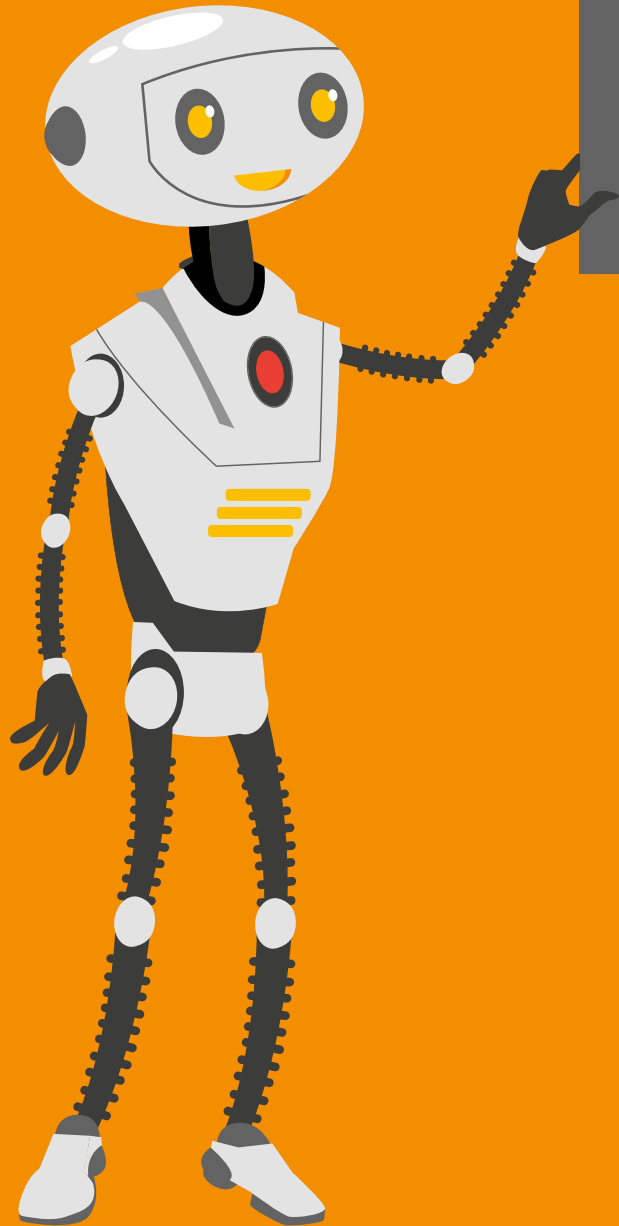
Term	Definition
4IR	4th Industrial Revolution
AR	Augmented Reality
AI	Artificial Intelligence
CEO	Chief Executive Officer
CIO	Chief Information Officer
CPS	Cyber-Physical Systems
ERP	Enterprise Resource Planning
HR	Human Resources
I4.0	Industry 4.0
IEEE	Institute of Electrical and Electronics Engineers
IIC	Inter Integrated Circuit
IIRA	Industrial Internet Reference Architecture
IoT	Internet of Things
IIoT	Industrial Internet of Things
ISA	International Society of Automation

Term	Definition
IT	Information Technology
MES	Manufacturing Execution Systems
MOM	Manufacturing Operations Management
MSOs	Manufacturing Strategy Outputs
RPA	Robotic Process Automation
SA	South Africa
SHE	Safety Health Environment
SOP	Standard Operating Procedures
VR	Virtual Reality

“As the Fourth Industrial Revolution continues to evolve, the winners will be those who are able to quickly adapt to change, upskill themselves and fully participate in entrepreneurship and innovation-driven ecosystems, providing new business models and ideas rather than those who can only bring certificates to the table or only offer low-skilled labor.”

– Nicky Verd

# 4IR Landscape in South Africa



Industry 4.0 (I4.0), also commonly referred to as the 4th Industrial Revolution (4IR) are interchangeable terms characterized by unavoidable progressive globalization, efficient and automated processes, and competitive rapidly developing business environments. The foundation of I4.0 is housed within Cyber-Physical Systems (CPS) which connects infrastructure, human resources, and computation power to transmit data in real-time. I4.0/ 4IR technologies include artificial intelligence, cloud computing, automation, 3D printing, the Internet of Things (IoT) & robotics.

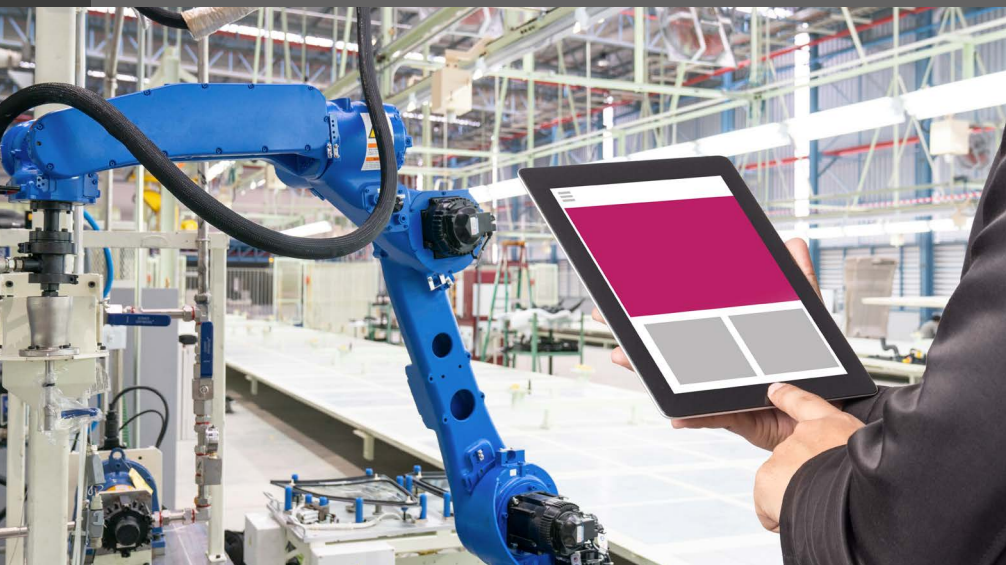
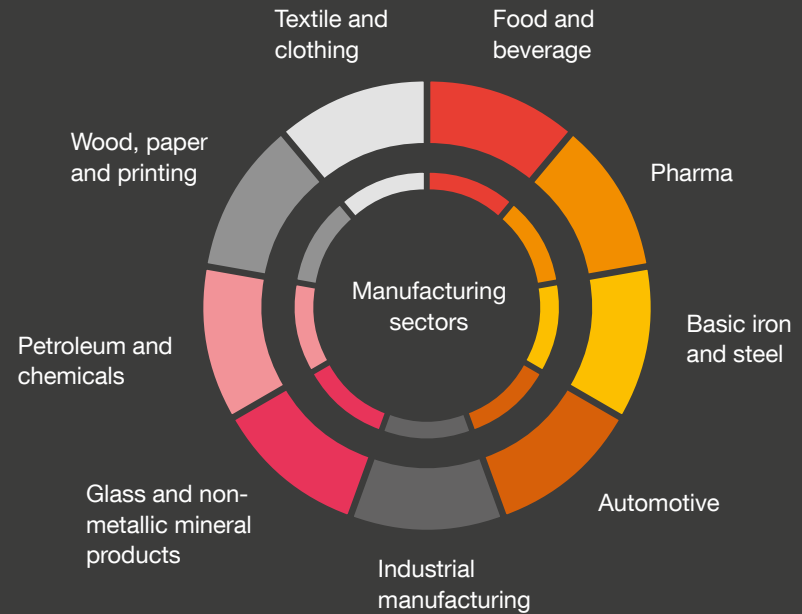
The manufacturing sector is the fourth largest sector in South Africa (SA) and Smart Manufacturing has become the direction of development. The development of I4.0 tools is only one component of the entire system. For manufacturing sectors to leverage the value, they need teams who understand the data to be able to translate it into findings that would benefit them. Digitalisation has created the possibility to adopt the progression of information and communication technologies within a limited period, which ultimately increases operational efficacy and sustainability.

One of the key motivating factors to incorporate I4.0 in the manufacturing sector is the ability to increase quality, flexibility, performance, and overall competitiveness. Through the incorporation of I4.0, a manufacturer can increase innovation and decrease the cost of production which leads to effective Manufacturing Strategy Outputs (MSOs). The integration of I4.0 has revolutionised the human resource processes and companies who merge the digitisation process with traditional approaches surpass those who are inflexible to the advancement of technology<sup>1</sup>. Technological advancements in the industry are causing rapid change and the SA manufacturing sector must embrace and adapt to the uncertainty to fully harness the potential of I4.0. Developing countries such as South Africa have the potential to exponentially grow their economies and combat various resource-related challenges.

The institutionalisation of I4.0 would contribute to the sustainability of developing countries specifically within the manufacturing industries as the economy is heavily affected by the lack of proper sustainability measures. SA has made noticeable progress in the adoption of I4.0<sup>2</sup>. In this report, we explore the readiness of I4.0 in the SA manufacturing sector.

# This research study

Through this research, we aimed to understand the I4.0 maturity of the SA manufacturing sector by gaining an intimate understanding of the value proposition of I4.0 in the various sectors. Furthermore, the research aimed to understand how adopting digital operations can materially affect the success or failure of a manufacturing organisation, how the adoption affects competitiveness/efficiencies with the overall aim of educating the SA industry on the gaps and 'the art of the possible' amongst their peers.



## A note on methods

The study took the form of in-depth, qualitative interviews with senior leaders across nine manufacturing sectors. The interviews were conducted by a team of highly trained qualitative interviewers.

*Note: Percentages may not total 100 due to rounding and/or the exclusion of certain responses.*

# What does the data say?

## 1. The leaders behind the 4IR Agenda

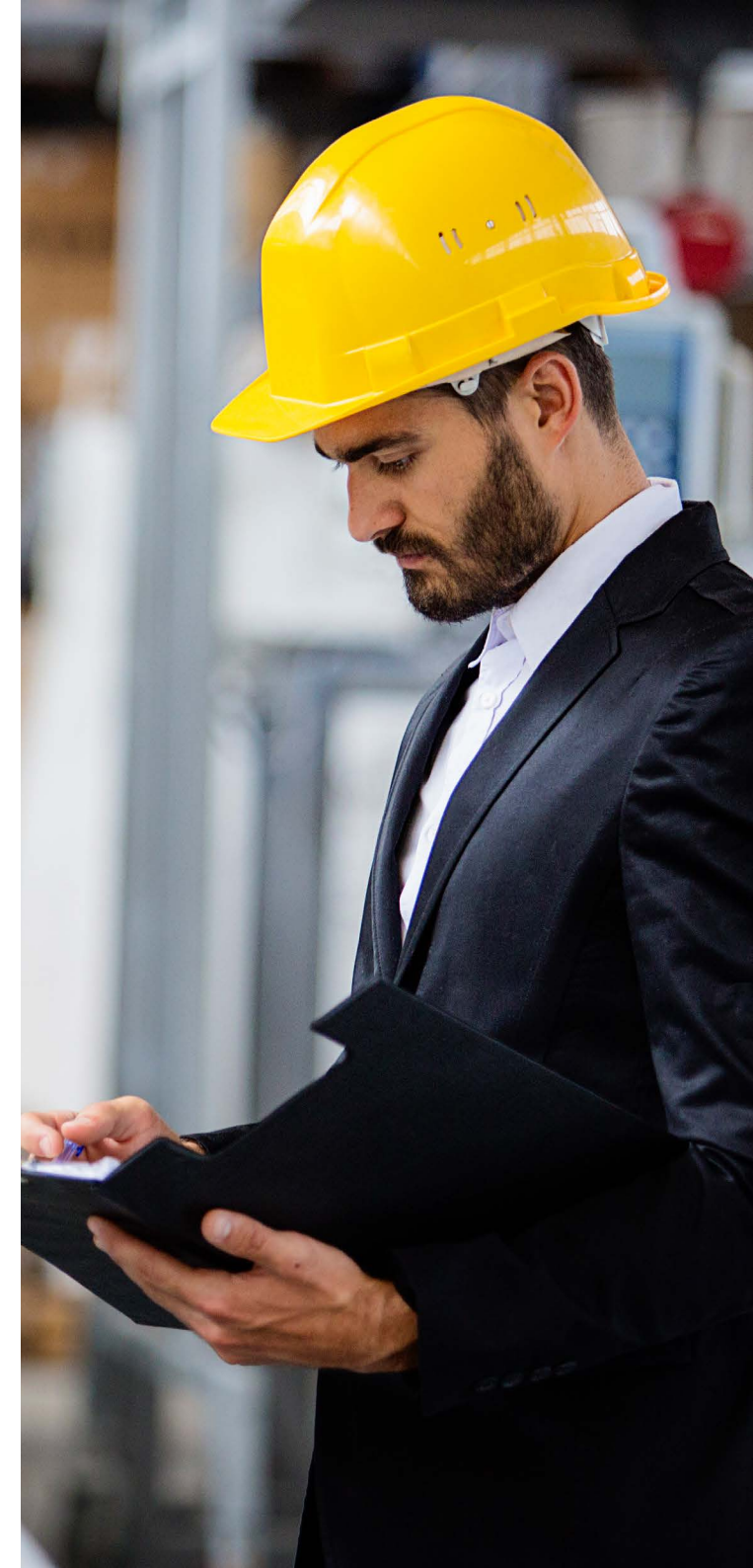
- CEOs realise the need for their businesses to develop and align with 4IR innovation to meet their ultimate business goals.
- Technical role players are key in assisting leaders to drive digital transformation. Leaders clearly indicate where they want their business to develop and the need to align innovation with their ultimate business goals.
- The drivers of the 4IR agenda are responsible for ensuring that digitalisation is effective and relevant in advancing competitive advantage.
- International funding allowed business leaders to be more innovative due to international testing and benchmarking, thereby reducing local risk during implementation.
- 4IR vision and strategy is greatly influenced by the manufacturing focus area.

## 2. Uncertain returns

- Investment in 4IR is very low, with most businesses engaged in it investing less than R10 million in digital transformation, with 16% of respondents indicating that no investment in 4IR had been made at all.
- Manufacturing companies that formed part of an international group tended to invest more in 4IR technologies.
- Company survival due to tough economic conditions was the business focus, resulting in investment in operations and production rather than in digital transformation.
- Investment risk due to South Africa's unstable political and economic climate, as well as poor infrastructure and logistics, were noted as a further deterrent to greater investment.

## 3. Data-driven decision-making

- Manufacturing automation in SA is 'selectively automated and connected', with no manufacturers reporting to be fully automated or having plans to be fully automated within the next five years.
- There is greater trust in automated data, with the quality of decision-making being based on the quality of the data that could be accessed.
- Participants rated the availability of real-time/near real-time data as the most important for decision making.
- Real-time/near real-time data was the most important requirement for decision making with advanced analytics being perceived as the least important requirement for good decision-making.
- 100% of participants were not familiar with reference architecture for data, but 10% indicated that they knew this for infrastructure.
- 32% of participants were not familiar with both MOM and MES.



#### 4. Degree of 4IR implementation

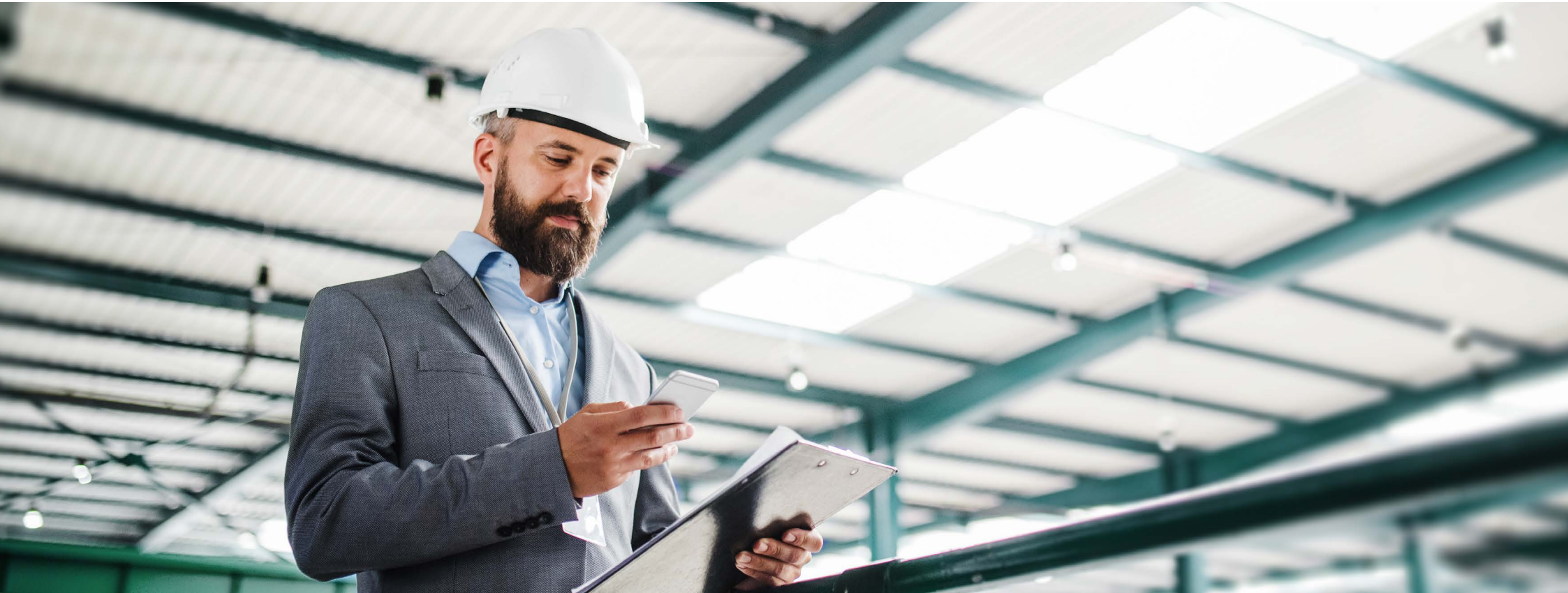
- All participating manufacturers were aware of some 4IR technologies and have started implementing some of these technologies – although to varying degrees.
- AI/Machine Learning was the least implemented technology, while Connectivity/IIoT was rated the second highest, most implemented technology.
- 4IR is reported to see the most impact in the end to end supply chain management, followed by logistics and shop floor to top floor visibility.
- The majority of participants had thought about the technologies they wish to implement in the next five years – despite a lack of funding and other technical challenges.

#### 5. A 4IR workforce

- 4IR brings with it a newfound need to upskill and re-skill employees.
- The manufacturing sector will always require employees – we should not see a reduction in staff, but rather the re-skilling and re-allocation of employees to less repetitive tasks.
- An increase in both skilled positions and skilled employees can be expected, thereby creating further employment opportunities.

#### 6. Challenges of implementation

- Uncertain return on investment was highlighted as a barrier to integrating digital innovation.
- Other challenges included resistance of worker councils or labour unions and the workforce lacking the skills needed to implement and manage digital solutions.
- Beyond the leadership and executive roles, the workforce lacks knowledge regarding the importance of data and technological implementation.



# Study insights

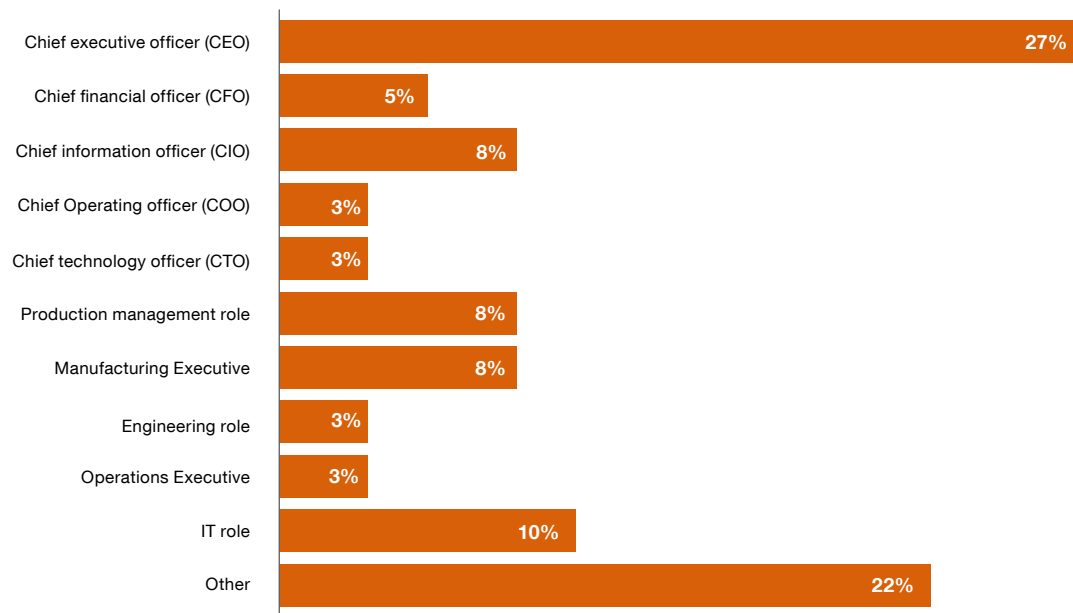
## Insight 1: The leaders behind the 4IR Agenda

### Exploring and creating 'trust in tech'- the role of the CEO

I4.0 is characterised by unavoidable globalisation, efficient and automated processes, as well as competitive and rapidly developing business environments<sup>3</sup>. Consistent with findings from previous PwC reports (2015 & 2021)<sup>4 & 5</sup>, we found that the CEO has been identified as the leading visionary for 4IR in the manufacturing industry in South Africa.

The CEO is responsible for staying up to date with the latest developments and embracing the 4IR way of thinking. They are responsible for challenging current approaches and methods used in the business, exploring new technologies that align with reduction in cost and increases in productivity. Overall, they are responsible for shaping the company's 4IR vision and ensuring that their vision is executed successfully.

Figure 1: Drivers of 4IR in the manufacturing industry



Deeper analysis indicates that in the Clothing and Textiles and Industrial Manufacturing sectors 4IR agendas are mainly driven by the CFO.

We also found that CFOs drive this agenda in the Food and Beverage sector.

"In the world of automation, and in the world where technology is developing fast and furiously, the CEO's role is to question whether things can be done more cost effectively in the use and deployment of new technology"

### Looking beyond the CEO

Through our findings, other key role players in the 4IR agenda were uncovered. While this included other C-Suite individuals such as the CFO, CIO, COO and CTO, we found that the adoption of 4IR was also guided by other roles in the manufacturing industry- particularly those in strategic, and IT executive roles. Supported by literature, our findings suggest that individuals in IT executive roles have a deeper understanding of I4.0, are aware of the challenges before them, and therefore view the actions needed to succeed in I4.0 more realistically than visionaries in the C-Suite<sup>6</sup>. Therefore, while the CEO may realise the need for their businesses to develop and align with 4IR innovation to meet their ultimate business goals, technical role players are key in assisting leaders to drive digital transformation.

### Looking to the future

Collectively the visionaries and executives all have a responsibility to ensure that the business remains relevant, efficient and competitive through 'exploring available technologies and investigating whether they are feasible and useful for application in their setting'.

We found that the main purpose of 4IR adoption is to increase the capability and diversification of the manufacturing industry by consolidating labour intensive and manual tasks. The majority of participating manufacturers felt that they/their leadership had a clear vision for the future of 4IR and that they fostered a culture of innovation to support this vision.



“From a developing country perspective (South Africa, India, Brazil) they should have a different vision. Technology should be used to enable people on the production line. The developing world has a competitive advantage, as these countries have a lower cost of labour; labour enables companies to be flexible in their production lines. Using technology to enable human capital is the competitive advantage in the developing world”.

## Shaping a vision

Despite the majority of participants identifying that they had a clear vision, we found three main factors which affect the way in which their vision of 4IR was shaped.

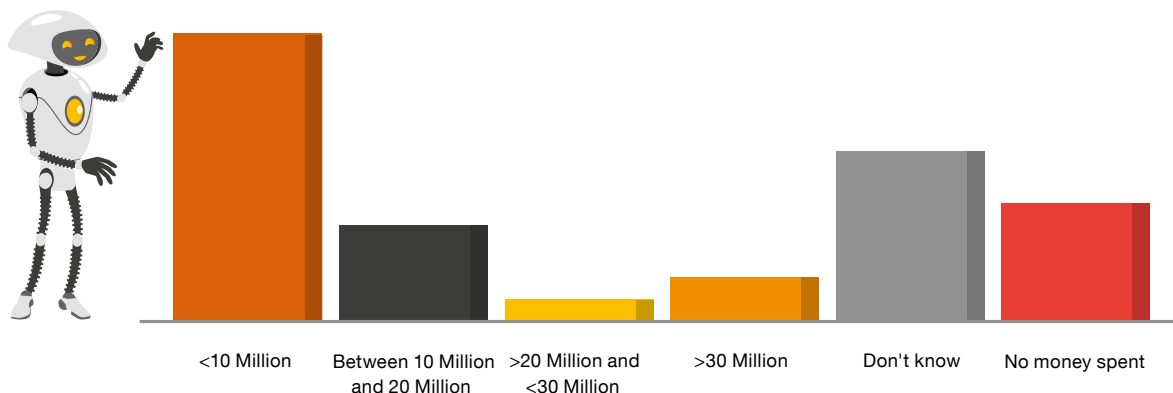
1. Source of funding and the country in which manufacturers operate appeared to directly affect the vision that the company had. When a company had international funding, their vision developed faster than those receiving local funding. This was due to the ability to integrate technology that had already been tested in other countries. The visionary knew the level of risk, what worked and whether there would be benefit to their investment. International funding thus allowed business leaders to be more innovative due to international testing and benchmarking.
2. 4IR needs to be considered from the perspective of the country in which manufacturers are operating. Some visionaries had a great concern regarding the workforce in the country they were operating from and would therefore stunt any major developments as they had no strategy to deal with the effects on the workforce. In addition, the vision was also impacted by the ability to trust data as received from the country. In certain sectors, they were more reliant on the data of the country before they could plan their own data strategy.
3. The type of operations is a consideration for whether or not a visionary considers 4IR as feasible for their company. Depending on the sector and the predominant use of traditional and manual tasks, visionaries had a harder time committing to digital transformation. In some cases, participants reported that they had implemented software within their offices but could not commit to including it in production. This was partially due to fear that if they change the process it would not work, the inability to invest further and navigating the workforce expectations and fears.



## Insight 2: Uncertain returns

The impact of the COVID-19 pandemic highlighted the position of multiple industries and the level of their digital transformation, globally and in SA<sup>7</sup>. It is reported that 37% of companies in SA had a transformation strategy to adapt to digital, while only 23.5% of companies had a functional strategy to enable remote working<sup>7</sup>. Many of the businesses were sporadically trying to incorporate 4IR in the areas where they could afford to.

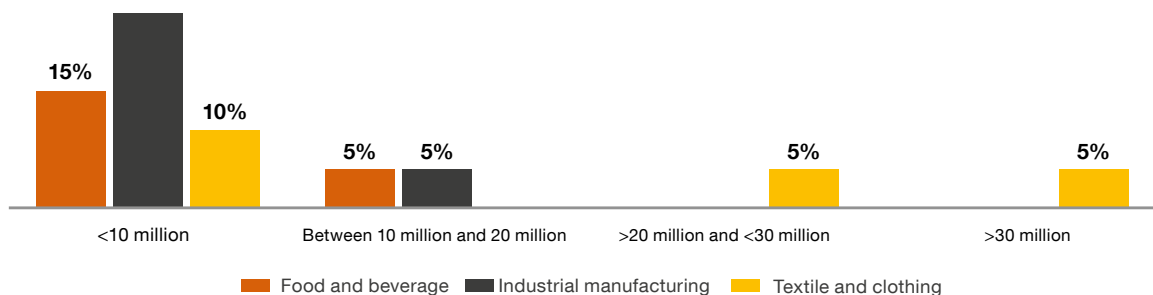
Figure 2: Investment made in 4IR the last financial year



“I think technology is not the differentiator of the market anymore. People are able to afford technology now compared to back then. I think I4.0 is important today because the differentiator moved and the ability to make accurate decisions quickly changed”.

Furthermore our insights indicate that the Food and Beverage sector is investing significantly in 4IR, compared to considerable investments made by the Industrial Manufacturing and Textile and Clothing sectors.

Figure 3: Investment made in 4IR the last financial year within 3 sectors



### Spenders or savers?

We found that the majority (40%) of participating manufacturers identified as fast followers within the ecosystem of 4IR. Within that context, the investment made in 4IR is cautious and experimental rather than definite, with a clear execution. Thirty-nine percent of participants reported spending less than R10 million on 4IR in the previous financial year while 16% reported not investing in 4IR at all. Only 6% of participants reported spending over R30 million on 4IR in the previous financial year. Overall, investment made into 4IR in SA manufacturing is substantially low. Investment risk due to SA’s unstable political and economic climate, as well as poor infrastructure and logistics, were noted as a further deterrent to greater investment.

“I would say digitisation and innovation have not been high on our agenda. They are on our scope, but we are trying to keep the lights on”.

### Uncertain return on investment

Literature investigating manufacturers investment in the 4IR revealed that more than two-fifths of companies in South Africa have made solid investments and more than a third are expecting these to provide a payoff on productivity<sup>8</sup>. However, more than half (57%) are still yet to make any investments in 4IR technologies as a result of certain barriers such as skills and technical challenges<sup>8</sup>. In this research, we found that the majority (39%) were investing under R10 million into 4IR. We found that the majority of the participating manufacturers were not able to invest further due to rising business costs and “just trying to survive”, however, they also reported fear regarding their return on investment. Uncertain return on investment and the lack of R & D budget were further exacerbated by COVID-19, which resulted in the 4IR agenda being side-lined while they attempted to stay in business. As a developing country, participants expressed that there is no sufficient R & D budgets to try and test new technologies and lose money in the process. Only well established, proven technologies for their specific needs would be considered.

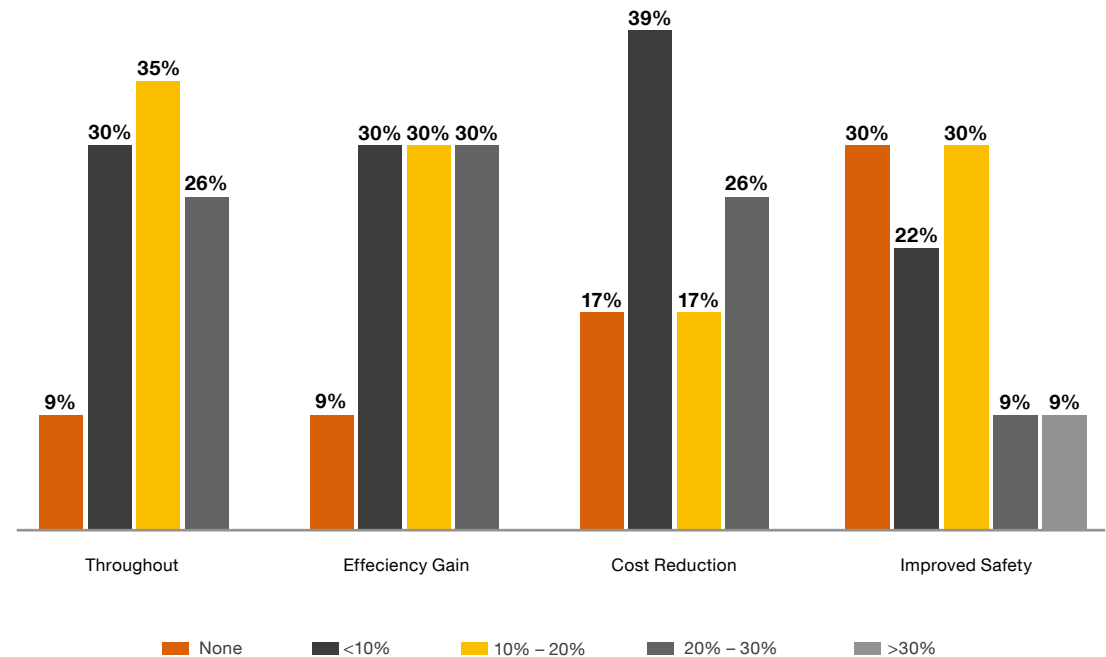
Findings highlighted a fundamental difference when it comes to which area of the business 4IR adoption would be prioritised due to the diversity of the industry. There is a differentiation between the business operations and the production line; therefore, the adoption of 4IR is integrated at different times and not necessarily in line with a specific 4IR strategy. We found that reliance on other industries within SA to ensure that their investment is effective was widely reported. This highlights a greater need for the country to have a strategy for digitalisation that is effective and produces data that can be trusted to ensure that the manufacturing industry has a solid foundation on which to make decisions regarding investments. From the findings we can confirm that businesses in South Africa that have international relationships or partnerships have a competitive advantage. This competitive advantage allows for less risk to be taken when implementing digital technologies as they are implementing tried and tested technologies. When a business starts with digital integration from the onset, acceptance is easier and the digital agenda guides all decisions.



## Looking to the future

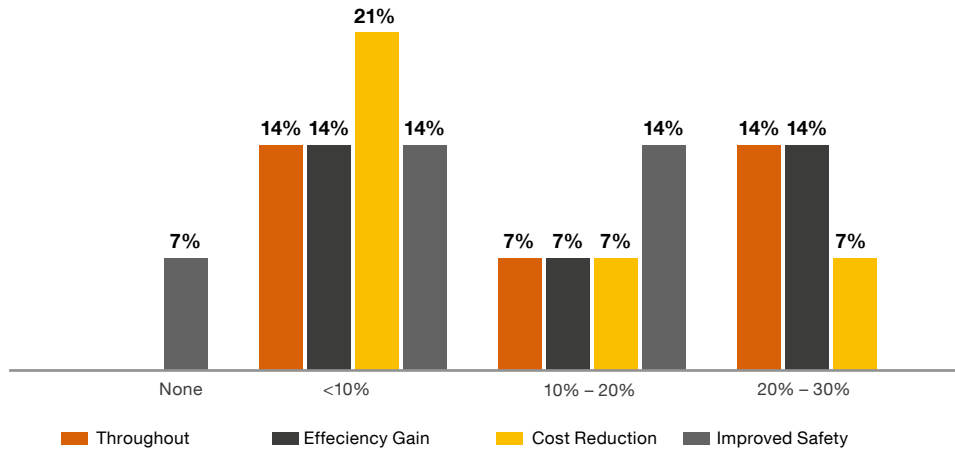
When participants were asked what they presume investments made over five years would give them, 35% predicted that throughput would increase between 10-20% – allowing them to see a return on their investment. Some participants indicated that it might take time for them to capitalise on the investment made depending on their specific sector. Thirty percent of participants maintained a 20%-30% increase in efficiency gain. This finding relates and concurs with a cost reduction expected by 82% of participants over the next 5 years. Thirty percent of the participants believed that there would be no increase in safety attributed to digitalisation, this contrasts with the 70% of participants who believe that safety will increase. The various sectors responded based on their current safety levels. Depending on the risk of injury, they were able to anticipate whether digital technologies would have any impact. In our study the increase was not significant as most participants indicated that they could not envision digital technology contributing to their workforce safety.

Figure 4: Cumulative benefits expected from 4IR over the next 5 years



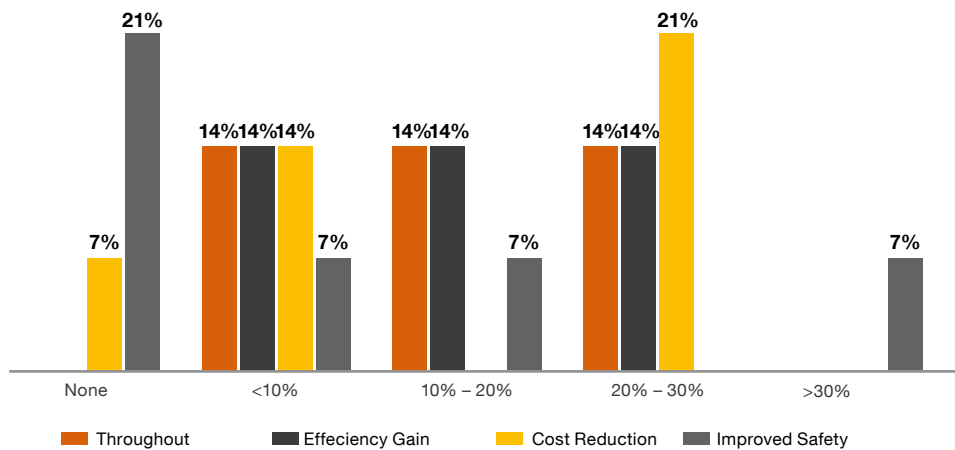
When we zoom in on the Textile and Clothing sector, we see 35% of participants expect Efficiency Gains. A further 35% of participants expect a reduction in costs. Throughput increases are expected by 35% of the participants. While 28% of participants expect safety improvements.

**Figure 5:** Cumulative benefits expected from 4IR over the next 5 years within textile and clothing



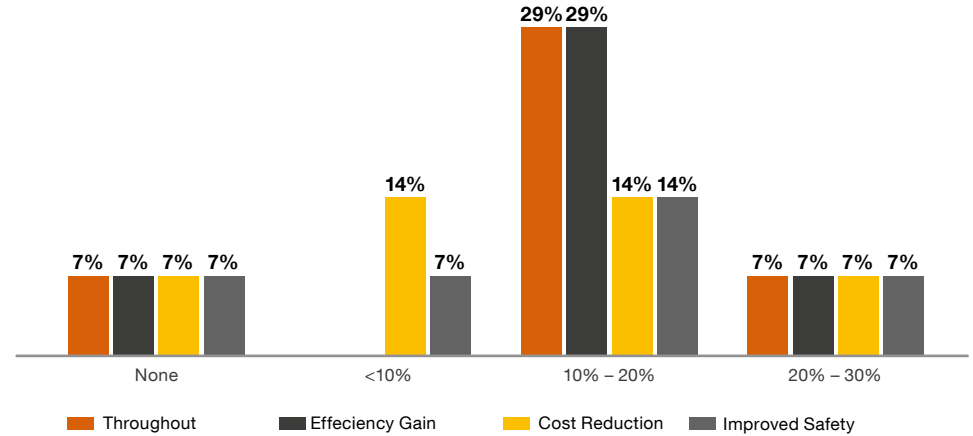
Benefits for the Industrial Manufacturing sector: Expected an increase in Efficiency Gains by more than 30% of participants. A further 35% of participants expect reduction in costs. While 21% of the participants expect little to no improvement in safety.

**Figure 6:** Cumulative benefits expected from 4IR over the next 5 years within industrial manufacturing



Expected Benefits for the Food and Beverage sector: Throughput and Efficiency Gains are expected to increase by more than 30% of the participants. A further 35% of participants expect costs to be reduced. While 28% of the respondents expect safety to increase.

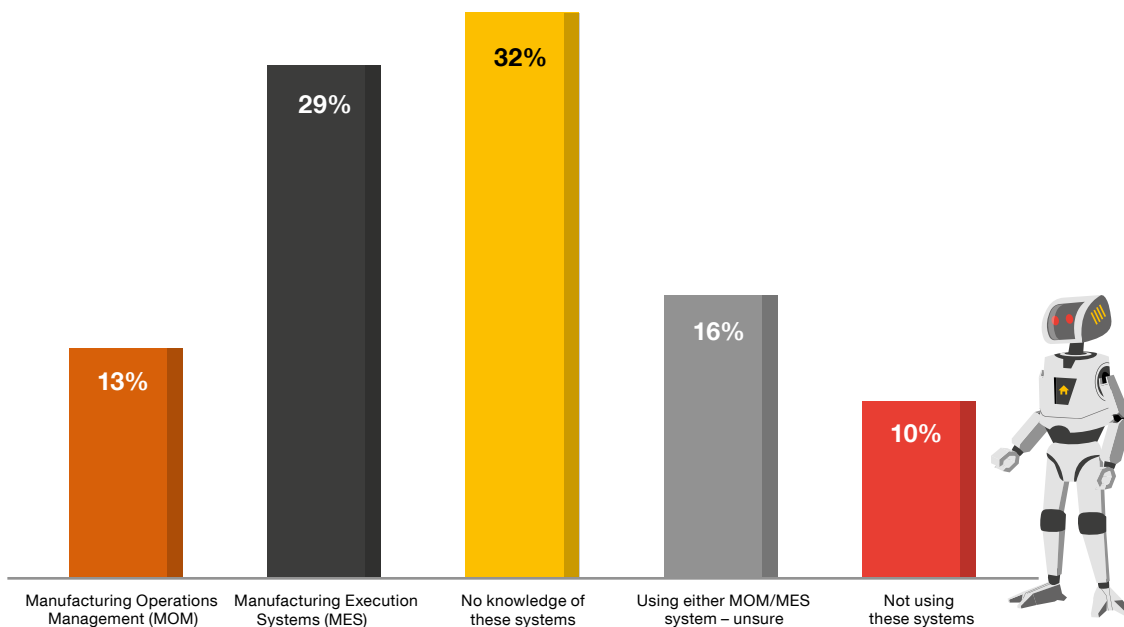
**Figure 7:** Cumulative benefits expected from 4IR over the next 5 years within food and beverage



## Insight 3: Data-driven decision-making

Data forms a very important part of the decision making throughout all the businesses. Even though it has been reported<sup>9</sup> that some leading manufacturers in South Africa use analytics to their advantage, most manufacturers are still in the early stage of adoption and have great potential to further increase their state of analytics readiness. Despite this, 57% of businesses in this study reported that they are selectively automated and connected. All of the respondents also indicated that data is very important in their decision making. Decision making was also influenced by the companies' ability to access and utilise quality data.

Figure 8: Utilisation of MOM/MES



“I don’t see it as something that would be efficient because there have been instances that I had predicted wrong information. I have doubts about data providing decision support because to do that, you need to have the correct data and if you don’t it may be dangerous”.

### Trusting the data

We found that participating manufacturers trusted data received from automated systems more than manually captured data. Due to low-medium levels of automation, a significant amount of manufacturers still reported using un-automated sources of data. Twelve percent of participants identified the state of captured data as a challenge and stated that they are “making sure we sift and choose the impactful data and being selective” until such a time that they would be fully automated. Those with more automated systems in place reported that “we use our data extensively for decision support. We roll out data in the different environments and regions into dashboards for decision making. Although not perfect, we trust the data we have”.

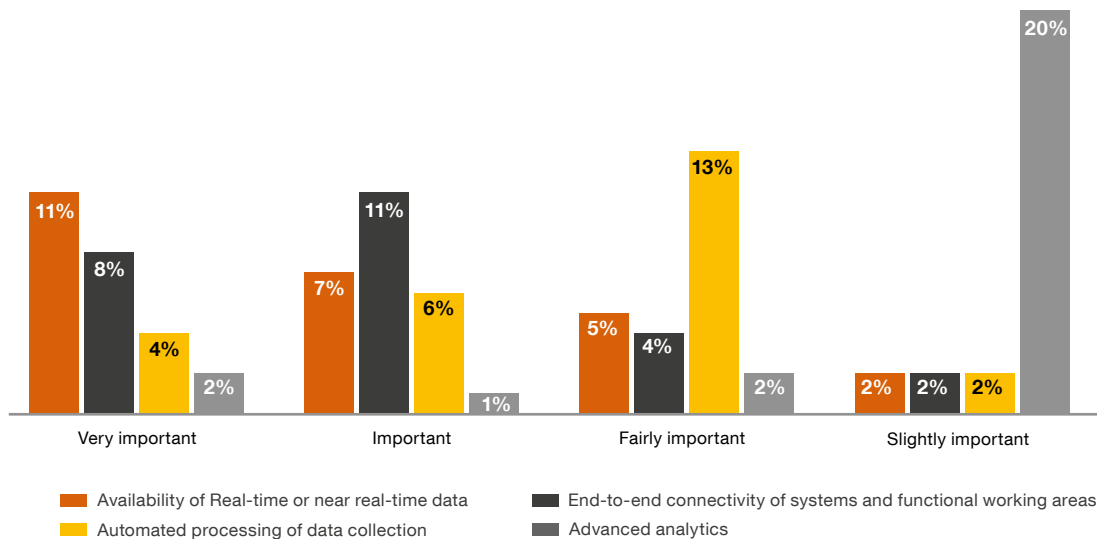
We found that participants could identify the challenges in trusting the data when it is not automated and reported on the importance of investment in digital integration. There were opposing views where respondents were unsure about the quality of the data even when automated and how efficient it would be for decision making. We found that a minority of participants were still unsure about the quality of the data even when systems were automated. This highlights the requirement for more knowledge sharing regarding technology and the impact that digital integration can have on decision making. It is important for all stakeholders involved in executive and technical roles to understand the benefit of technology and to trust the technology before we can start thinking of implementation. If the industry does not fully understand the benefit of the technologies, they would be less likely to invest in 4IR. Certain industries have been trading traditionally for many years and it is vital to get buy-in from visionaries as well as the workforce. In most cases, respondents wanted the benefit to relate back to the return on investments. When respondents understood 4IR within a specific sector they were more likely to plan for the adoption of digital technologies even if they do not currently have the funding.

## So much to choose from, so little time

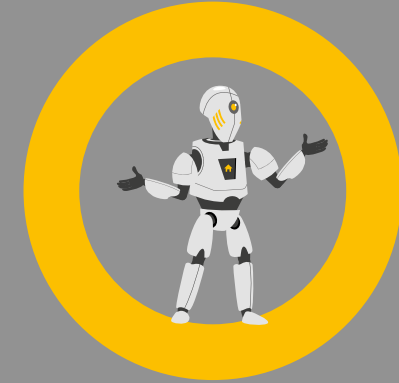
Effective and efficient decision-making is a priority for everyone and, to make reliable decisions that affect the business positively, we need accurate data. Respondents unanimously agreed that they use data for decision support. When asked to rate the ability to access data in terms of what would be most important, participants rated them in the following order:

1. Availability of real-time/near-real-time data was the most important information needed to ensure effective decision making. With the availability of real-time/near-real-time data businesses would have the ability to make strategic decisions more rapidly, adapt to the market and increase their competitive advantage.
2. End to end connectivity and functional working areas of systems was rated as the second most important source of data. Participants reported that they would be able to ensure continuity from the source to target systems and increase data quality.
3. Automated processing of data collection was rated as the third most important as it would allow processing to happen faster. Participants referred to automation a lot throughout the interviews, however, when discussing the rating they stated that it would be best to have automation once the data is current and consistent.
4. Advanced analytics was rated the lowest, but not necessarily because it was the least important contributing factor to efficient decision-making data, but rather because advanced analytics could only be implemented once the three other areas were integrated into their business. The outcome of this finding would assist manufacturers in understanding which area to invest in first depending on the type of data they would find most beneficial.

Figure 9: Most important digitalisation for assistance in effective decision making



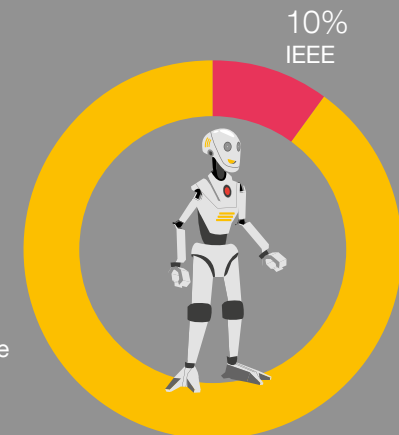
## What reference architecture do you use for data?



100%  
Don't know

Reference architecture provides a common boundary in which companies have the ability to have a centralised architecture for referring to data within a specific domain. It provides a standard within which to discuss implementation. When asked about the reference architecture used for data in the manufacturing industry 100% of the population said that they do not know. 10% of participants reported that they used IEEE for reference architecture specifically in infrastructure. With 90% of the population reporting that they do not know.

## Reference data architecture used for infrastructure



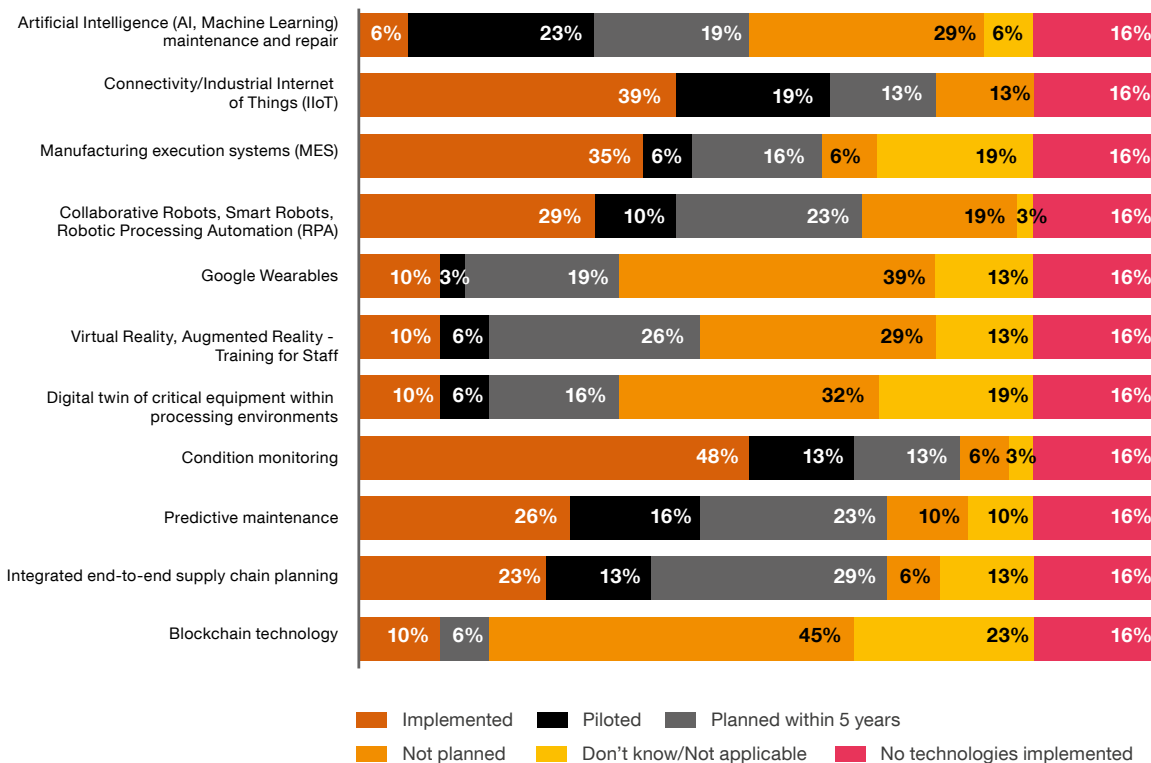
90%  
Don't know/  
not applicable

10%  
IEEE

## Insight 4: Degree of 4IR implementation

The manufacturing sector has been estimated to dominate the global economy through increased adoption of industrial robots, whereas automotive, transportation, and chemical segments are projected as the leading emerging markets<sup>11</sup>. Despite low investment in 4IR, we found that the majority of the participating manufacturers were aware of, and have implemented, 4IR technologies in some form.

Figure 10: Degree of 4IR implementation



### What technology is being used?

- Condition monitoring (48%) was rated the most implemented 4IR technology. Nearly half of the participants were exploring various degrees of condition monitoring within their businesses. This technology was deemed important as it provided businesses with real-time/near real-time data to use in effective decision-making. In addition, it allowed businesses to forecast when they needed to do maintenance on machinery or when they needed to be replaced. This finding aligns with the previous findings where participants rated real-time/near real-time data as the most important data source.

- Connectivity or IIoT (39%) was rated the second most implemented 4IR technology. Participants found that using sensors in the business machinery helped to improve the obtained data which assisted with throughput, operational efficiencies and data quality. Connectivity was one of the factors the majority of participants referred to as non-negotiable. Even if the connectivity was not established to its full potential, participants still indicated that it is extremely important for data distribution.
- Robotic Processing Automation (RPA) was implemented by 29% of participants, but the maturity of RPA differentiated across the sectors.
- AI/Machine Learning (6%) was the least implemented technology and participating manufacturers had little knowledge of how it could be implemented.
- Across all 4IR technologies, manufacturers could identify their importance and noted that they would start piloting these in the next five years.

### Impact areas

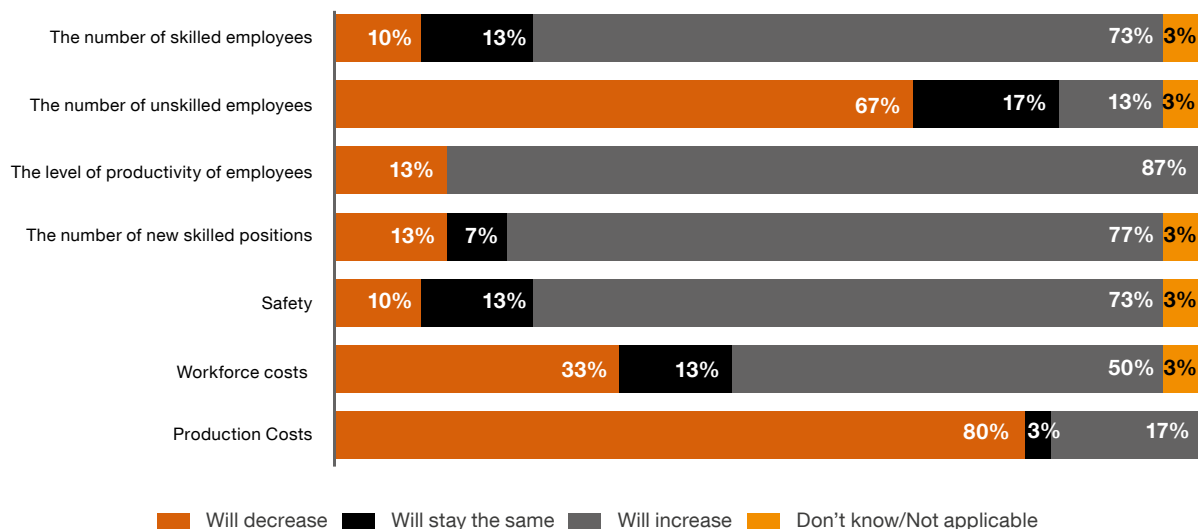
In understanding the context of where funding was allocated, we wanted to understand which areas of the business participants felt would be most impacted by digitisation. The top 3 areas were found to be:

- End to end supply chain management “It doesn’t only look at what is happening at the plant but also at what is happening in the market.”
- Logistics. We found that participants had an interest in technology that would enhance logistics, which formed an important part of the business. Through automation they would be able to keep track in a more efficient manner. “We are looking at different technologies that show how we can track products and perform stock counting while sitting at home. There are too many manual things happening which are taking a lot of time and people.”
- Shop floor to top floor visibility. “This has been the drive of our investment in the last couple of months. The level of shop floor engagement would be so much better when the top floor is using the same data set and the same visuals. It closes the gap between the shop floor and management.” Participants indicated the importance of all levels of the business having access to and understanding the data so that decision making can happen swiftly. Various decisions have to be made at various operational levels and the accurate communication of data from one source to another is vital for success.

## Insight 5: A 4IR workforce

Reflecting on digitalisation and the workforce, literature reports that the number of unskilled workers will decrease due to the integration of 4IR. Even though new technologies can create new jobs, they can also nullify and replace existing jobs, creating a newfound need to upskill and re-skill employees to ensure they remain relevant in the workplace<sup>12</sup>. It is further mentioned that the effects of 4IR on work and employment are forecast to be complex, potentially heightening inequality by reducing demand for low skills<sup>13</sup>.

Figure 11: Impact on workforce



### What is the predicted impact on the workforce?

#### Unskilled workers

The majority of participating manufacturers (67%) agreed that the number of unskilled employees would decrease. This is in line with literature which suggests that South Africa has a significant skills shortage due to failings in its education system, limiting the supply of workers needed for 4IR<sup>13</sup>. We found that the number of unskilled employees was not necessarily linked to a reduction in employment rates, as manufacturers were eager to upskill employees to complete more fulfilling tasks while being open to the idea of automation and digitisation paving the way in terms of repetitive and laborious tasks. It is therefore important to consider how upskilling would happen within each sector. Manufacturing industries that would maintain or increase their unskilled workforce should consider the capacity building that needs to take place and whether this training would make use of digital technologies.

#### New skilled positions and skilled workers

We found that 73% of participants reported that the number of skilled employees will increase, with 77% in agreement that new skilled positions will increase because of the implementation of 4IR.

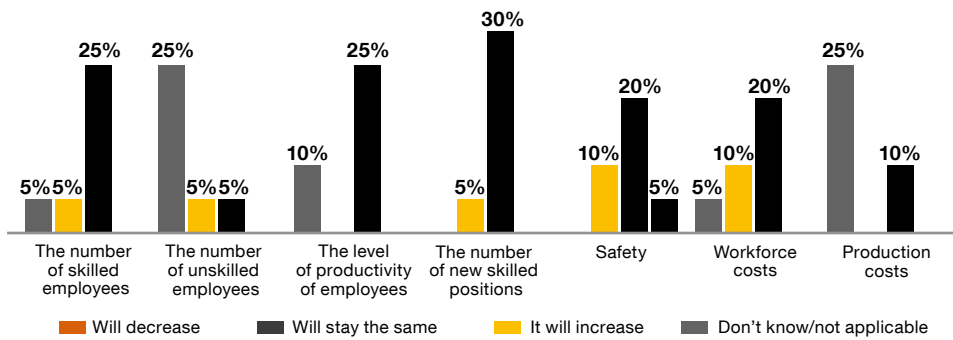
In terms of impact on the workforce, the growth within this area indicates 87% of participants expect an increase in productivity and 80% of participants expect a reduction in production cost. Given the fact that 4IR is changing how we work, live and socialise, it is expected that a number of skills are mandatory to thrive in this new technological era, deliver high expectations and use technology to serve employees and their companies.





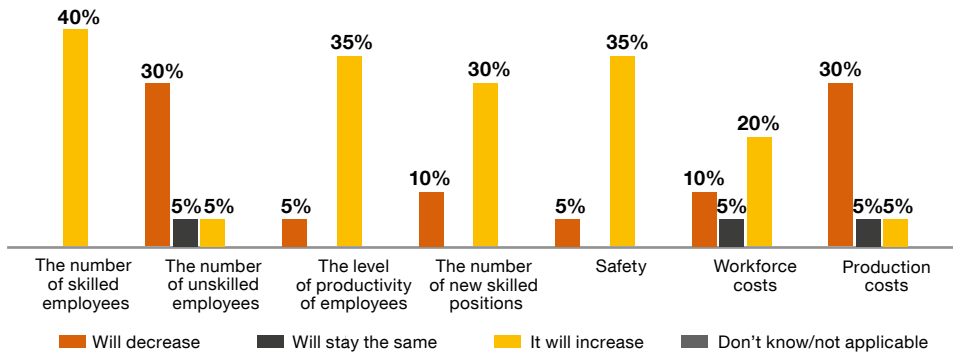
The impact on the workforce within textile and clothing: 5% of participants expect an increase in skilled labour whilst the level of productivity of employees is expected to stay the same by 25% of participants. The number of new skilled positions is expected to stay the same by 30% of participants, whilst a further 10% of participants expect increase in safety. Workforce costs are expected to increase by 10% of the participants, while 10% of the respondents expect production costs to stay the same. This shows an overall improvement in efficiencies with higher paid skilled staff.

Figure 12: Impact on workforce within Textile and Clothing



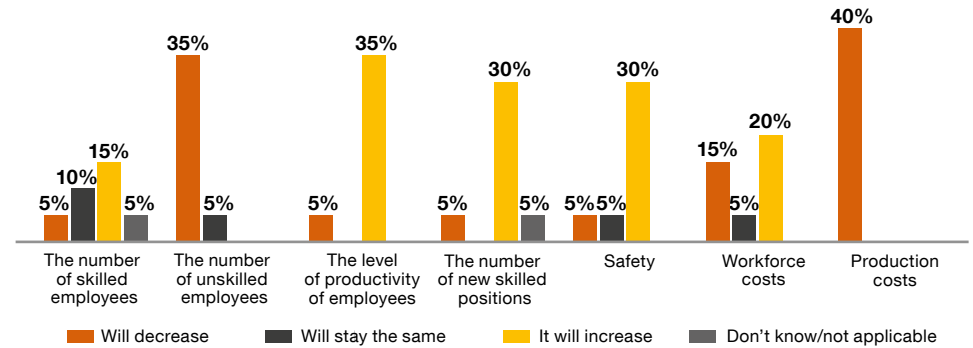
The impact on the workforce within Industrial Manufacturing: A significant increase in skilled labour is expected and the level of productivity of employees is expected to increase by 40% of participants. The number of new skilled positions is expected to increase by 30% of participants, with a further increase in safety is expected by 35% of the respondents. Workforce costs are expected to increase by 20% of participants and production costs are expected to decrease by 30% of participants. This shows an overall improvement in efficiencies and safety with higher paid skilled staff.

Figure 13: Impact on workforce within Industrial Manufacturing



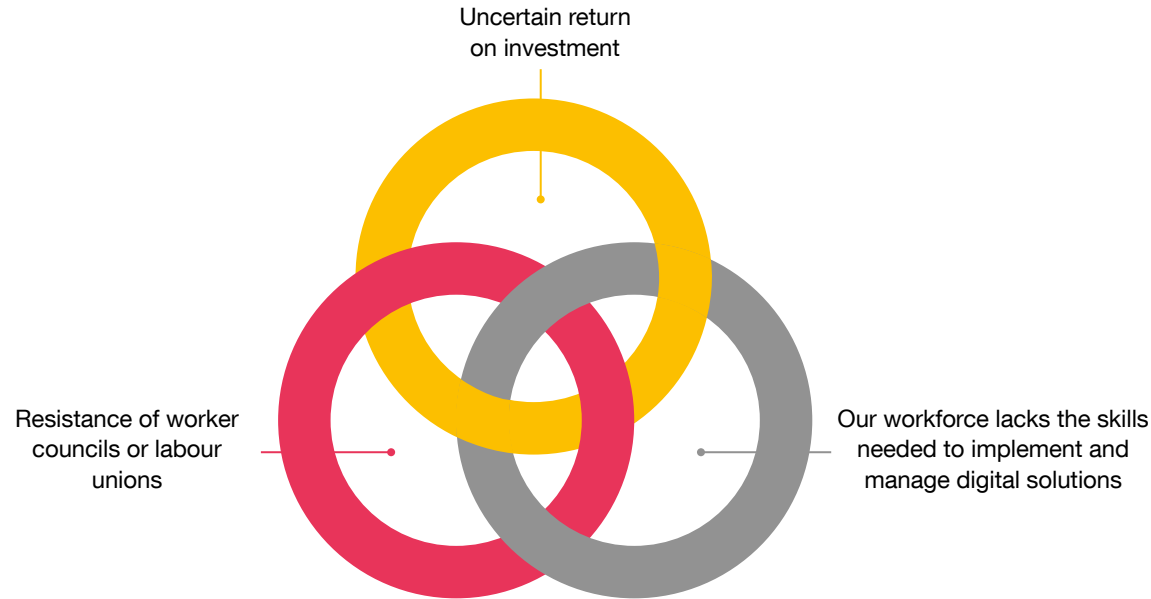
The impact on the workforce within Food and Beverage: An increase in skilled labour is expected by 15% of the respondents. and the level of productivity of employees is expected to significantly increase by 35% of the participants. The number of new skilled positions is expected to increase by 30% of participants, with a further 30% expected increase in safety by 30% of the respondents. Workforce costs are expected to decrease by 15% of participants, while a significant 40% of the respondents expect production costs to decrease.. This indicates an overall significant improvement in efficiencies with higher paid skilled staff and improved safe workplaces.

Figure 14: Impact on workforce within Food and Beverage



## Insight 6: Challenges of implementation

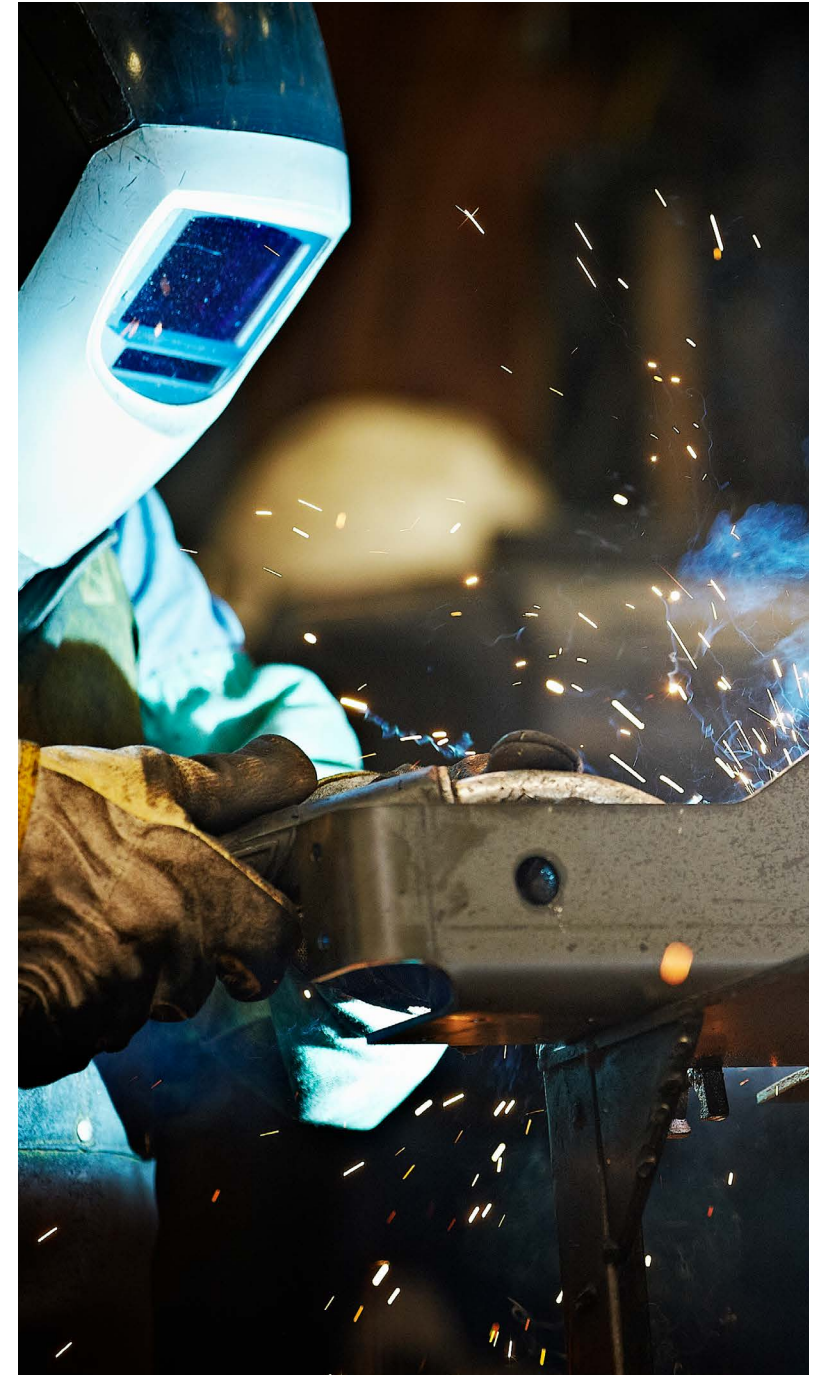
### Top 3 challenges associated with implementing digital in an organization



#### 1. Uncertain return on investment

This challenge was highlighted by 23% of participants as a barrier to integrating digital innovation. Within the current economy in South Africa, participants reported that they were merely “trying to survive” and, therefore, they did not have unlimited resources to invest in digital technology without the assurance that it would have a positive impact in a short amount of time. Another matter of uncertainty was which digital technologies to invest in. We found that a lack of knowledge regarding what type of technologies would yield the best investment had an impact on the confidence to pursue.

“A challenge in SA is a lack of knowledge and awareness about the firms world manufacturing developments. We don’t know if we are at the cutting edge because we don’t have the knowledge on this. Use blockchain as an example: most people don’t know what this is- there is no engagement in the space- It can be more secure and speed up the process- but it feels like this is light years away from us”.



## 2. Resistance of worker councils or labour unions

Fifteen percent of participants rated resistance of worker councils or labour unions as a challenge. Many participants referred to the influence on the workforce and the decrease in unskilled workers. One participant mentioned that they employ 30 000 workers, and whenever they start with this discussion, it is met with great resistance. This challenge is the reason why companies that are based in areas where they employ many unskilled workers only explore digital technology in terms of the business and not in production.

## 3. Workforce lacks the skills

Thirteen percent of participants indicated that their workforce lacks the skills needed to implement and manage digital solutions. This could be attributed to the nature of the industry. “We will always need farm workers, but we might also need more workers who understand the digital technology we would implement.” We found that the participants believed that the greater workforce does not understand the importance of data and therefore served as a hindrance in terms of building capacity within the current space. Due to the lack of understanding and fear of what digital technology would mean for the current workforce, many businesses would rather err on the side of caution.

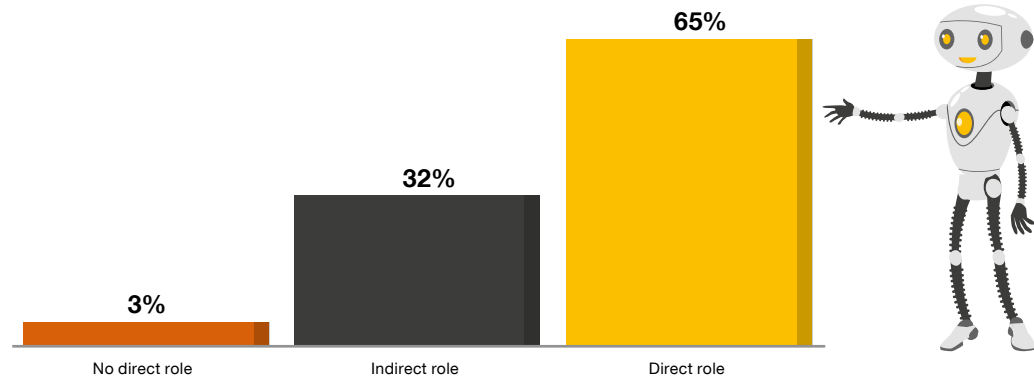
It is important for manufacturers to consider how they would assimilate the workers who are in production into the new environment and assist them to understand the 4IR landscape. The findings are somewhat consistent with the literature as it has been revealed that the implementation of 4IR technologies is challenged by a lack of adequate, relevant skills, the unavailability of training capacities, expensive technologies, and negative perceptions such as fear of job loss by industry professionals<sup>14</sup>. Therefore it is important for manufacturers to consider their data strategy and plan for the future. If unskilled workers are part of the plan for a specific sector, the importance of training should be considered.

“People don’t appreciate the value of data and information. In the factory, when you require certain schedules to be completed, people don’t inherently think what the purpose is and that it can make things better. There is a certain immaturity around this. If the business doesn’t grow there are no opportunities for anyone so we are trying to create these opportunities. It’s probably not very different in the rest of the world”.

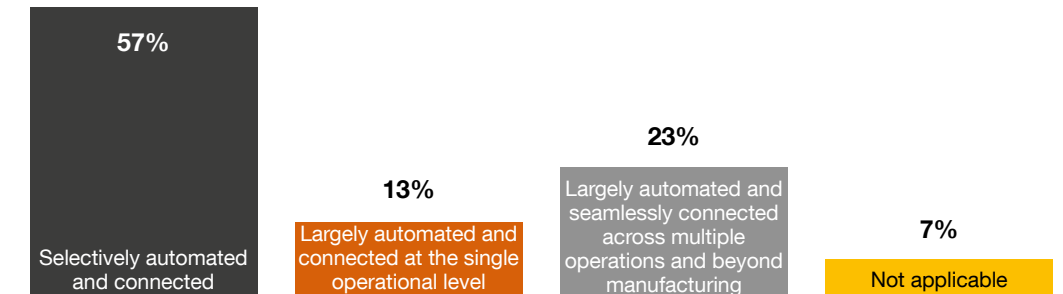
## Leaders or followers?

Projections from the literature suggest that I4.0 should be worth USD 337.10 billion by 2028 and South African consumer industries will experience an increase of up to R411 billion between then and 2036 if digital transformation is adopted. For the financial benefits to translate to industry, the South African workforce must be adequately prepared and open to partnerships to enhance digital transformation<sup>15</sup>. Through the insights discussed, the South African manufacturing industry is rated as followers instead of leaders. The manufacturing industry is currently following the lead of the global sectors to make decisions on what would work best when implementing 4IR. The South African manufacturing industry rated 65% of the population as having a direct role in new product development. They have partnered directly with OEMs to design, build and test innovations. Most of the businesses that formed part of the study fell into the Fast Follower category. More than half the participants reported being only selectively automated and connected (57%), indicating that there is undoubtedly substantial growth and implementation which still needs to take place.

### Role in new product development



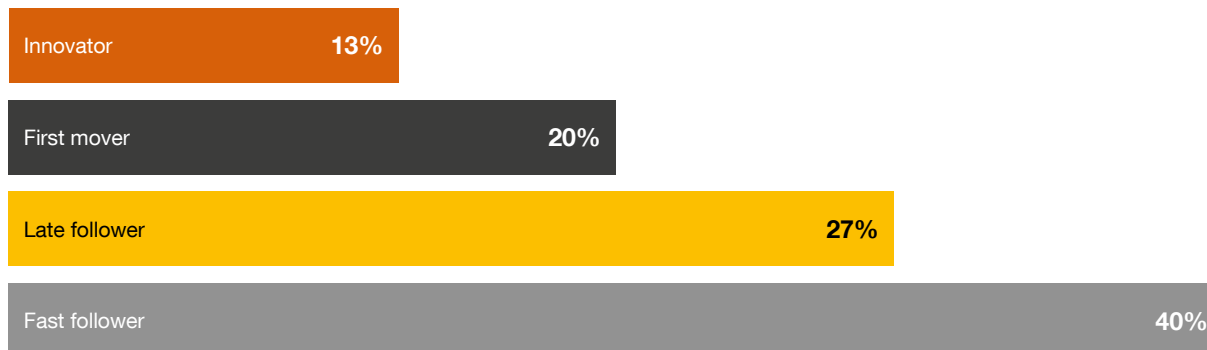
### Level of automation



Based on the insights which emerged from the data, we recommend the following for the SA manufacturing sector:

- CEOs are generally appointed as the visionary of the 4IR strategy. However, the findings show that it is important to have technical role-players as part of the visionary team. To reach the projected target, the South African manufacturing industry would have to increase investments. To increase investments that would be effective, reliable and produce a competitive advantage, a partnership between the CEO and technical role-players would generate the most success. As the technical role players would be able to assist with a data strategy as a foundation on where to start investing, the CEO or executive leadership would be able to find financial sponsorship.
- The findings showcase the financial pressures that inhibit the industry from committing to 4IR. Therefore it might be a starting point for manufacturers to partner and share the risk of investing in digital transformation. Alternatively, the businesses that form part of international groups could explore the funding opportunities presented by some respondents. Most of the respondents hold a direct role in new product development, which could be another form of partnership that could link financial capability to increase 4IR. Currently, our respondents have defined themselves as digital followers but as a result of their direct role, these industries can become innovators as they have the potential and experience.
- There is a great opportunity for the manufacturing industry to enhance the implementation of digital transformation. Another avenue to reach the anticipated potential is that the industry should pledge more attention to becoming innovators within the digital space. Through a clear data strategy, the key role players in the area could evolve from being selectively automated and connected to fully automated and connected.
- It is recommended that the sectors start working on a strategy that mitigates the decrease in the number of unskilled workers. In the context of South Africa's unemployment rates, the integration of 4IR may increase this economic and social challenge. Some respondents mentioned that training could be an option to reduce the amount of unskilled labour that 4IR would replace. If a strategy is created, more preparation could plan the way forward with worker unions and the government.

### Stages of digital integration



We can conclude that the majority of South African manufacturers are aware of 4IR and exploring various forms of technologies, despite a lack of funding in place. No participants reported that they were unaware of the benefits digitisation could have in their business. Despite the challenges of funding, lack of knowledge with regard to best practices for digital integration and fear of the unknown, they have started investing in digital technology. Implementation of technology and piloting of new technology is currently happening and South Africa could see the impact of this in the next five years. Where businesses have not implemented digitisation, they are planning and working on strategies to start exploring within the next five years. Visionaries are upskilling themselves and gaining new knowledge by attending global conferences and engaging in a global setting on these topics to ensure relevance.

It should be noted from the findings that South African manufacturers are navigating through this transition and adapting to all the changes, as some of them learn in their infancy, others digest through their medium levels of adoption and a few use the experience and lessons while they master the art of 4IR. In this agile environment, they are all committed to creating the best South African manufacturing industry possible.



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