

Technology and collaboration as strategic drivers shaping higher education

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Strategic drivers are the most powerful agents of change not only altering industries, but also the strategic landscape of South African Higher Education Institutions (HEIs). Within this volatile, uncertain, complex and ambiguous (VUCA) world, technology and collaboration and its interrelatedness seems most profound for HEIs. Therefore, exploring the impact of technology and collaboration as strategic drivers would allow South African HEIs to serve its socio-economic purpose more effectively. In support of this aim, an interpretive paradigm, employing qualitative methods, was pursued. A qualitative survey design was utilised whereby semi-structured interviews were conducted with 17 research participants occupying senior management positions at seven public and one private South African HEI. Data were analysed in applying conventional content analysis with the assistance of Atlas ti. The results confirmed technology and collaboration as strategic drivers and to be critical for South African HEIs. Especially the importance technology was emphasised by the coronavirus disease 2019 (COVID-19) pandemic, while technology also render collaboration more accessible for HEIs. To this end, South African HEIs have to rethink strategy post COVID-19 in using technology to enhance technology integrated teaching and learning practices within the realm of the fourth industrial revolution (4IR). Furthermore, to also collaborate nationally and internationally to ultimately develop the higher education sector.

Keywords: collaboration; higher education institutions; strategic drivers; strategy; technology; 4IR.

Introduction

It would seem as though the most powerful change agents in an industry's strategic landscape are so-called 'driving forces'.^{1,2,3} These driving forces are also referred to in the literature as change drivers, drivers of industry development,^{1,2} drivers⁴ and strategic drivers,⁵ the latter term alluding to the strategic nature of these change agents. In literature, these strategic drivers denote the pressing issues and areas of contestation that will determine the future direction, not only of individual organisations but of the industry as a whole.^{2,3,4,5} When specifically looking at higher education, it would appear as though technological advances and the fourth industrial revolution (4IR) adaptation are crucial for the growth and positioning of Higher Education Institutions (HEIs) and investment in education technology is sorely needed.^{6,7} Additionally, HEIs need to strengthen collaboration between HEI policymakers and leaders, promote collaboration internally as well as externally between academics, as well as with external stakeholders to foster innovation.⁸ From the literature, there is enough evidence emphasising the importance of technology and collaborations to warrant a study in determining their status as strategic drivers.^{8,9} However, despite technology and collaboration emerging as pertinent issues in higher education, it is unclear – whether they could be labelled strategic drivers for HEIs in South Africa. In other words, are technology and collaboration regarded as powerful agents of change able to shift the strategic landscape of the higher education sector? Affirming these as strategic drivers will not only make HEIs aware of these drivers but also alert institutions to include technology and collaboration in their strategic thrusts towards the socio-economic agenda.

In conducting this study, an interpretivist paradigm with a qualitative research approach was used, followed by a qualitative survey^{10,11} as a research strategy. Semi-structured interviews with 17 senior management-level staff from eight South African HEIs were conducted. Research participants were purposively selected, and data were then analysed by means of conventional content analysis,¹² assisted by ATLAS.ti.

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Review of relevant literature

The literature review commences by interrogating the concept of strategic drivers, where after the discussion will turn to the importance of technology, the 4IR and collaboration for HEIs, especially in the light of recent disruptive events that have occurred.

Strategic drivers

According to De Wit,³ there seems to be no singular definition to accurately define strategic management. However, De Wit³ insists that strategy is concerned with aligning the organisation with the environment it operates in. For this reason, a thorough understanding of the business environment is required for the continued existence of any business organisation. Although it is vital to consider the whole external environment, the industry environment seems most crucial in developing relevant strategies to deal with disruptive change events in a volatile, uncertain, complex and ambiguous (VUCA) world. To only understand the nature of the industry might not be sufficient, as managers need to know and understand the direction in which the industry is developing in order to ensure fit between the organisational agendas and industry development. In order to keep abreast of industry development, questions such as 'what are the drivers propelling industry development?', and: 'what patterns of development do industries exhibit?' should be interrogated.³ In support, Porter¹³ emphasises the importance of understanding the intensity and nature of the five competitive forces present in an industry (these being the threat of new entrants, substitute products and services, the bargaining power of buyers and suppliers and inter-firm rivalry within the industry). With this 'Five Forces' model, Porter¹³ underscores the general volatility associated with any given industry. Higher education is no exception, as the broader higher education sector is influenced by these developments and trends that require strategic action.¹⁴

It is generally accepted that as industries pass through their life cycles, the transition from one phase to the next is accompanied by change. However, there seem to be more reasons for change than merely transitioning from one life cycle stage to the next. Change may also be caused by the presence of factors that influence different role players, competitors, buyers and suppliers to alter their course of action. The most powerful of these factors are described as 'driving forces' and exert influence on the industry environment to change.² These driving forces, or strategic drivers,⁵ often occur in the macro-environment but mostly emanate from the industry environment.^{2,5} De Wit³ extrapolates this notion of strategic drivers further and postulates that drivers that originate from within the industry are to be grouped according to the five competitive forces of buyers, suppliers, new entrants, substitute offerings and inter-firm rivalry.

Porter¹ purports that industry development usually commences with a prevalent industry structure presenting a

scenario of how to deal with entry barriers and counter the threat of suppliers and buyers' bargaining power. However, this structure evolves over time because of changes caused by evolutionary processes and strategic drivers such as research and development, marketing innovation and investment decisions (to take advantage of new marketing or manufacturing opportunities). Yet, the inverse can also occur, in that no change is forthcoming within an industry, as organisations choose not to pursue these opportunities. This makes the direction of industry development exceedingly unclear. Furthermore, industry changes may occur because of a combination of strategic drivers or because of the actions of one organisation claiming industry leadership. In the absence of a distinct industry leader, it would be safe to assume that changes are the result of a combination of strategic drivers, and industry development is thus steered by industry dynamics.³ Although these structures, and associated investment decisions, may be unique to specific industries, it would be safe to assume that some evolutionary processes or strategic drivers are generic across industries, with technological change and manufacturing process innovation being prime examples of such generic strategic drivers.^{1,2}

Similar to South African studies on strategic drivers in South African HEIs,^{4,5} Bender, Partlow and Roth¹⁵ conducted a study on strategic drivers for multinational hospitality organisations in the USA to develop strategies within an uncertain environment typified by heightened global competition and rapidly changing technology. In the South African studies, technology (coupled to 4IR) and collaboration emerged as strong driving forces, and therefore this study endeavours to take a closer look at technology, with the inclusion of 4IR, and collaboration as strategic drivers for South African HEIs.

Technology

Technology has long been seen as vitally important for the sustained existence and longevity of HEIs.¹⁶ However, academics' willingness to use technology in the teaching and learning environment seems to have been a barrier towards online and blended learning. This changed, literally overnight, with the outbreak of the coronavirus disease 2019 (COVID-19) pandemic and associated lockdowns in 2020. The pandemic forced HEIs to rethink their teaching and learning delivery modes to accommodate students and staff not being physically present on campus. Mhlanga¹⁷ purports that COVID-19 necessitated education to adopt 4IR technologies for teaching and learning. At the same time, Mhlanga¹⁷ also warns that this adoption of digital technologies could lead to a digital divide and widening inequality. David et al.⁶ further purport that investment in education technologies is sorely needed, as this will make education more widely available. As 4IR technologies allow for students to learn anywhere, HEIs need to investigate avenues for a swifter transition towards 4IR compliance.¹⁸

According to Schwab,¹⁹ the transformation that technology will bring about is quite intense, and unlike anything the world has previously experienced, and 4IR will fundamentally change governments, institutions and the manner in which people live, work and relate to each other. For this reason, technology and the acceptance of 4IR are paramount for the positioning and growth of HEIs. According to Deviet al.,⁷ HEIs will have to invest in the quality, quantity and distribution of human resources in preparing staff for the challenges of 4IR. Yende⁹ postulates that 4IR has become an important driver for higher education, affirming the role of technology to restructure fundamental teaching and learning methods by means of digitalisation. In support, Mashau and Nyawo²⁰ state that HEIs will have to rethink teaching pedagogies in the process of adopting e-learning and to improve the success and experience of students.

Elayyan²¹ warns that 4IR will cause job losses in traditional fields such as medicine (i.e. doctors), engineering, programming but would also create opportunities in areas such as big data, robotics, artificial intelligence (AI) and three dimensional (3D) printing. Yet, according to Eckstrand,²² the humanities will remain relevant, as machines cannot replace the human mind where specific mental processes, judgements, analyses and categorisations are required.

Collaboration

Lašáková et al.⁸ purport that a lack of collaboration is hindering innovative educational practices and societal development. To create such a collaborative environment within HEIs is a challenge, but remains important as new opportunities are created within a broader working milieu, spurring effectiveness in institutions. Lašáková et al.⁸ suggest that innovation should be fostered through HEIs strengthening collaboration between policy makers and HEI leaders. This will create a more collaborative working environment and build relationships, networks and cohesiveness between institutions and academics and with external role players.

To enhance collaboration, Universities South Africa (USAf) is assisting South African HEIs with various challenges that are present in their respective environments that are hindering collaboration. Universities South Africa is also assisting HEIs to develop effective partnerships with local, national and international stakeholders to transfer knowledge and expertise.²³ Bergman²⁴ refers to a 'triple helix' or a three-way collaboration framework whereby HEIs, government and industry partners work in close-knit to develop a region. The opportunities for collaboration do exist, as there seems to be a drive from abroad to establish partnerships and networks with Africa and African HEIs to rejuvenate African HEIs rather than provide aid to them.²⁵ The growth in the number of public and private HEIs necessitates partnerships with private HEIs to promote better collaboration within the higher education sector.^{14,25} Furthermore, Kwiek²⁶ also affirms that research collaboration internationally is of strategic

importance especially in a system where resources are inadequate. Porter²⁷ emphasises the benefits for students, academics, support staff and research when sharing a vision and also in distributing resources between institutions.

Conclusion

To remain relevant in the current higher education landscape, HEIs need to continually review and rethink how they fulfil their basic mandate of providing quality teaching and learning and generating new knowledge to advance society in general. Technological advances, the rise of 4IR and a proliferation in the adoption of information and communication technologies (ICTs) made it possible for HEIs to survive the massive disruptions brought about by COVID-19. Technology has afforded HEIs the ability to rise to the challenges posed by COVID-19 is also opening up new possibilities for both teaching and learning, as well as research. The 4IR world and the associated technologies within it have also opened up new possibilities for collaboration and collaborative arrangements between academics, HEIs and stakeholders and therefore enhancing teaching, learning, research and resource availability.

Rationale for conducting this study

Resultant from the perspectives presented in the literature review, it is apparent that uncertainty among HEIs occurs regarding technology and collaboration as strategic drivers. Derived from the research problem presented above, the research question for this study is stated as follows:

- Could technology and collaboration be viewed as strategic drivers for HEIs in South Africa?

Further to this research question, the primary objective of this study is thus:

- To explore how technology and collaboration, as strategic drivers within South African HEI landscape, play a role in defining the realities of higher education in South Africa.

Research methods and design

This study forms part of a PhD study embarked upon by the first author, D.R., and should be viewed in this context. The second author was the supervisor of the PhD and an active co-author of this article. This study was conducted from an interpretivist perspective, as the study sought to understand how technology, manifested in the 4IR and heightened collaboration, is impacting South African higher education as strategic drivers. The study is therefore in essence exploratory, focussing on context and aiming to illuminate gaps in understanding.²⁸ Neuman²⁹ reminds us that studies of an exploratory nature are well suited to interpretivist inquiry.

Furthermore, qualitative research methods were employed in this study. Not only are qualitative methods normally associated with studies of an interpretive nature,³⁰ but they also emphasise the social construction of reality.³¹ In the context of this study, when trying to understand how

technology and collaboration are impacting the higher education landscape as strategic drivers, the insights of those who actively play a role in shaping the reality of higher education are essential for the researcher to reach meaningful conclusions. These insights were obtained through a qualitative survey¹¹ hailing from eight different HEIs across South Africa. Seven of these institutions were state subsidised, and one was a privately funded HEI.

From each of these institutions, three senior-level managers were purposively selected. These senior-level managers included Vice-Chancellors, Deputy Vice-Chancellors, Registrars, Executive Deans, Executive and Senior Directors, as well as Directors. Of the 24 potential interview subjects selected, interviews were conducted with 17 of them. The remaining seven targeted interview subjects' work commitments were of such a nature that no suitable time could be arranged for interviews to be conducted. It is important to note that when data collection commenced, Lockdown Level 5 was announced because of the COVID-19 pandemic in which people, with the exception of a few were homebound by government. By this stage, only one interview had been conducted. As a result, the remaining interviews had to be conducted via Zoom or MS-Teams.

The interviews took the form of semi-structured interviews that were informed by literature and previous research of the authors. Data forthcoming from the interviews were analysed by means of conventional content analysis,¹² to avoid predetermined codes. Aided by Atlas.ti this method of analysis allowed for codes, categories, subthemes and themes to flow spontaneously from the data^{12,29} assisting to build the essential narrative and thus achieving stated research objective.

Following transcription of the interviews, open coding was conducted aided by the 'content analysis' tool of Atlas.ti. A total of 987 codes emerged. This was reduced to 42 categories once initial codes were interrogated and combined into larger categories, and inter-relationships were explored between these categories. A second round of scrutiny followed. This time all the codes alluding to technology, 4IR and collaboration were re-organised and analysed to allow an essential narrative to develop concerning how the 4IR and technology driven collaboration are impacting higher education as strategic drivers. This narrative centres around four core themes, which will be elaborated upon in turn.

Ethical considerations

An application for full ethical approval of the greater PhD study was made to the College of Business and Economics Research Ethics Committee and ethics clearance was received on 03 February 2020 (No. CBEREC20SOM01). In addition, ethics clearance and informed written consent were also obtained from the institutions and research participants who constituted the sample for this study. Proof hereof is available on request from the first author.

Further to this, since humans were involved, all procedures performed in the study were in accordance with the ethical standards of the College Research Ethics Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Findings

From the interviews, it is clear that the 4IR world we find ourselves in laid the foundation for dealing with the sudden and disruptive change brought about by COVID-19. Therefore, within the context of higher education, technology is generating new avenues for teaching and learning and research by making collaborative arrangements possible. The narrative that follows postulates that a certain context exists within the higher education environment where technology and collaborative arrangements can be enhanced to the benefit of teaching and learning, as well as research activities.

Please note that in the interests of brevity, a limited number of excerpts from interviews are used as supporting evidence. More evidence is available upon request from the authors.

Theme one: The macro context of higher education

Research participants expressed views on the broader context within which higher education operates. The forces at play within this context can be seen as drivers of higher education in their own right. Two important forces emerged from interviews with research participants, these being globalisation and market forces and change. These shall now be discussed in turn.

Globalisation

Globalisation is viewed by all research participants as an important and significant strategic driver for HEIs in South Africa. They describe globalisation as a much broader development than internationalisation, which aims to shift the competitive advantage of businesses and populations. This distinction is also encountered in literature.³² Research participants opined that globalisation allows for the hybridisation of ideas, which can lead to major advances in, among others, curriculum design and development and transformation.

The interviews also revealed that COVID-19, global rankings, competition and inequality between HEIs, geopolitical risks, demographic differences between the global North and South, student migration within Africa and neoliberalist economic policies either create challenges or impact South African HEIs directly. These views are also echoed in studies by Kigotho,³³ Sabzalieva, Moscovitz and Brunner³⁴ and Maslen.³⁵

A research participant, interestingly, suggested the term 'glocalisation', thereby staying locally relevant while remaining globally relevant. Other participants felt that globalisation could be pursued through phases of global

TABLE 1: Extracts from the interviews on globalisation.

Participant	Statement
Participant 4	'Some aspects, e.g. global convergence and divergence is like a pendulum – over time, the approach of globalization, will bring about the swings. The Fourth Industrial Revolution (4IR) brings about a way to manage the swings and through virtualisation. I think the view of “globalization” should be inclusive of virtual boundaries.'
Participant 12	'... As mentioned, students will be able to internationalise virtually and study abroad virtually in a multi modal way. There will be greater opportunities for students to study abroad. Higher education will become a virtual global intellectual spaces.'
Participant 14	'It also makes possible technological advancements for learner analytics for the monitoring and tracking of students' success and students support and ultimately that enhances the quality of university education...'
Participant 15	'it also allows us to grow our international profile uhm ... and our internationalisation, which makes us more attractive uhm ... to international students and international staff members, uhm ... so collaboration is very uhm ... is one of the focuses ...'

convergence and divergence facilitated through 4IR-enabled platforms. As online teaching and learning platforms are transferring higher education into a virtual global intellectual space, the right combination of international staff and students is important to maintain stature as a world-class institution, a sentiment also encountered in literature.³⁶ Participants see collaboration as a strategy to grow an institution's international profile in order to make it more attractive for international staff and students, which seems to be consistent with views expressed in literature.^{37,38} Refer to Table 1 for excerpts from the interviews.

Market forces and change

Most research participants are of the opinion that South African HEIs are subject to a VUCA environment, making higher education a particularly complex environment to operate within, a sentiment also forthcoming in literature.^{39,40} Participants mentioned that this VUCA environment is typified by radical and large-scale change, a drive towards technological rejuvenation and a strong focus on innovation. Of the research participants mentioned that there is a drive among South African HEIs to be initiators of change. However, to do so, participants suggest that HEIs need to reinvent themselves and redefine their purpose in an ever-changing world.

Although the reality of competition among HEIs was acknowledged by research participants, some opined that there should be less competition, as HEIs should complement one another and work together to take advantage of opportunities. Therefore, areas of collaboration should rather be pursued to the benefit of all HEIs. The reality of competition between HEIs is also cited by other scholars.^{41,42,43}

The COVID-19 pandemic is regarded by research participants as driver of change for HEIs as it not only altered how HEIs went about the task of education, but it also forced HEIs to prepare students differently for the world of work. This is consistent with views from the literature^{44,45} that COVID-19 had a huge impact on higher education. Higher education institutions, especially residential institutions, were rooted in face-to-face teaching and learning, and COVID-19 forced institutions into online teaching and learning literally overnight, a point emphasised by Mhlanga.¹⁷ Some participants

TABLE 2: Interview excerpts on market forces and change.

Participant	Statement
Participant 3	'... technology and innovation has demonstrated ... that there's a new paradigm, there's a new way of doing things and there's a new generation of students, and that way in which the world is evolving, is going to be fundamentally different from the way we understood it.'
Participant 3	'... those institutions that can make ... that can make the shift in mind set and begin to capitalise on the opportunities, are probably going to be better placed to engage with the future...'
Participant 13	'... COVID-19 was a new uhm ... curve ball and created quite an interesting uhm ... drivers to get the fourth industrial revolution rolling, uhm ... to get teaching and learning on another level.'
Participant 6	'... we need to collaborate and partner with others to ensure that we do offer a quality uhm ... blended learning experience to students, uhm ... of all backgrounds.'

feel that investment in technology is still needed to utilise the full potential of online teaching and learning. Although some felt that the debate around 4IR had subsided during the pandemic, it did act as a catalyst for advancing technology-based teaching and learning. Refer to Table 2 for excerpts from the interviews.

Theme two: The impact of technology

From the interviews, it is apparent that technological advances are critical and important strategic drivers, not only for South African HEIs, but for HEIs around the world. This is also consistent with sentiments from literature.⁹ Most research participants were of the opinion that although HEIs were debating how to be more involved in the 4IR for some time, the real impact thereof and the technology associated with it became a reality with the global COVID-19 pandemic and the transition to the online learning space.

Research participants all agreed that online or blended learning is an imperative for HEIs in South Africa, now and in the future. This sentiment was also affirmed in literature.^{17,46} Although research participants tended to emphasise the technologies needed to facilitate teaching and learning, especially in times of disruptive change such as COVID-19, some participants mentioned the importance of focussing on innovative pedagogies as well as innovative teaching and learning spaces to promote learning. Innovations in the fields of virtual reality, augmented reality and mixed reality as tools to enhance learning were also touched on by research participants as areas that need to be explored to take advantage of the possibilities offered by technology in the teaching and learning environment, a point also emphasised in literature.⁴⁰

Some research participants emphasised that it is crucial for HEIs to become trendsetters in terms of technology, or producers of technology, rather than merely users of technology that rely or focus on the transformative nature of technology, as this is where institutions could find a basis for competitive advantage in future, by providing a superior online student experience.

Research participants also felt that technology is an enabler of internationalisation, as it provides an opportunity to study anywhere in the world, a sentiment shared by Xing et al.¹⁸

Although this is seen as a positive point, it is also felt that this can impact South African institutions negatively, as students may decide to rather study at a reputable international institution than conduct their studies at local HEI. Though it is widely accepted that online learning is more cost-effective, the opposite was also raised by research participants, because of additional backend operational costs.

It is also commonly accepted by research participants that technology is there to make it all easier. However, within the South African context, there seem to be many challenges, as society is not prepared to encompass the shift to accelerated technological advancements in the higher education environment, as there are sentiments that it will lead to a widening of the social divide that is already quite vast in South Africa, a point emphasised in literature.¹⁷ Furthermore, there is a fear that technology may render certain work categories obsolete, a very real fear HEIs need to take heed of when developing curricula and positioning themselves for the future.

Understanding the impact of technology, as well as the role of innovation in this process of technology adoption, will allow South African HEIs to better prepare themselves and to serve its social obligations more effectively, as the opposite may render an institution irrelevant as the world continues to move down a trajectory dictated by technology and 4IR.⁴⁷ Refer to Table 3 for excerpts from the interviews.

Theme three: Collaboration

The interviews revealed that not only collaboration but also strategic partnerships were emerging as important issues for HEIs, which could not be ignored or marginalised. These collaborations centred mostly around intellectual, research, staff and student exchanges aimed at expanding knowledge creation and/or teaching and learning initiatives.

Research participants are of the opinion that collaborations with both the Global North and South need to be considered, as the Global South has a better understanding of the South

African context. It is felt that such collaborations will not only enhance teaching and learning as well as research capabilities but also cultural experiences. Such sentiments are also encountered in literature.²⁵ Participants warned, however, that care should be taken when entering into collaborative arrangements, as the quality of these arrangements would affect the outcomes thereof. It was also apparent from the interviews that a potential challenge to collaboration would be to maintain a multidisciplinary or interdisciplinary focus, which is important to HEIs on an institutional level but not necessarily so important on the departmental or individual level. However, real-world challenges are usually multi-faceted, and it is felt that pursuing solutions from multiple perspectives could yield better results.

As research participants view cross-pollination of knowledge as a vital progression for the longevity of HEIs, transdisciplinary collaboration is regarded as a strategic driver for academic programmes and research, views also expressed in literature.⁴⁸ Collaborative research not only helps building research capacity but also promoting teaching and learning. From the interviews, it is also apparent that collaboration with industry and government is vital for the development of relevant and current academic programmes. This idea is also purported in literature, where Bergman²⁴ refers to such collaborative arrangements as a 'triple helix framework'.

At the end of the day, however, the overwhelming feeling from research participants is that collaboration assists in developing people through collegiality, openness and forging networks in creating a collaborative space with less of a competitive focus, a view also purported in literature.⁴⁹ At the same time, however, some research participants did reflect on the current state of collaboration between academics. They commented that even within a given institution, people still tended to operate in isolated 'silos', thereby underscoring the necessity to promote the concept of collaboration between academics, not only between different institutions but also within the same institution, as this type of collaboration is dependent on the interactions and initiatives of individuals. This is a sentiment also affirmed in literature.⁸ Also, collaboration with government at various levels and stakeholders should not be ignored.

Yet, what is painstakingly obvious from the interviews is that collaboration between academics can be taken to new heights by the application of technology. Rapid developments in digital technologies, coupled with exponential expansion in ICT usage, has affected companies' collaboration activities in many industries,⁵⁰ and higher education is no exception. Increased digitisation has led to the growth of e-business, which has necessitated changes in how companies go about their daily operations.⁵¹ Again, higher education is no exception here. Not only have electronic platforms such as MS Teams and Zoom become commonplace for facilitating meetings, colloquia, workshops, public lectures and conferences during and in the aftermath of the COVID-19

TABLE 3: Quotations from the interviews on the impact of technology.

Participant	Statement
Participant 6	'... we've been theorising about the Fourth Industrial Revolution, for some time and that we've now seen just how remarkable the impact of technology is on higher education, it's been foregrounded and starkly and brought into focus by the global pandemic because we now realise just how critical uhm ... digitalised ways of working and living and being are and universities should have been ready for that but we were I think caught on the back foot ...'
Participant 15	'I said the current context that we find ourselves in with the lockdown and the need to move things online has clearly illustrated the, the dependence of our society and our community in higher education sector on the availability of technology and the ability to harness it and to utilise it in order to achieve our objectives ...'
Participant 11	'... not just think of technology, but also you know, how uhm ... innovative pedagogies need to be included, because it's not just about delivering differently, it's not just about going and teaching online, it's actually really thinking very, very carefully how technology can enhance the teaching and learning space.'
Participant 9	'... technology which has been punted as a saviour but in a socio-economic condition, that does not favour the use of that technology, what happens in the country. So we are facing this ... this dilemma, on the one hand technology globally, and the fact that we are engaging one another now ... we have been shifted into an accelerated technology adoption'

TABLE 4: Excerpts from the interviews on collaboration.

Participant	Statement
Participant 11	'So if you not collaborating inter-disciplinary and inter-disciplinary and the multidisciplinary way and with partners from outside the institutions, then you can't be a problem solver. Because if you cannot solve real lively problems, real life problems are multidisciplinary and they involve a multiplicity of role players and stakeholders.'
Participant 4	'... you had to collaborate to synergise with industry, to co-create a solution ... Yeah but it's not just collaboration, it's co-creation of that competitive edge...'
Participant 12	'... Universities should be "forced" to work closer together, share expensive equipment and some facilities if in the same regions. Doing away with unnecessary competition ...'
Participant 4	'... focus on the collaboration and how we can all help each other to achieve more as a South African university system by assisting each other from our points of strength. So even though you've got your elite universities and you're your HTIs every university is gonna have a set of strengths and niche areas and capabilities that they could be putting at the disposal of the broader system that helps the system to be better than it is in terms of all the you know, the sum of its parts.'

pandemic, but learning management systems are playing a more important role than ever before. Teaching and learning are becoming distinctively more blended, even at 'traditional', purely residential HEIs. This enables institutions to provide better-quality education to students. Furthermore, the opportunities for collaborative research with peers from different parts of the world are tremendous, as digital platforms do not only facilitate meetings and discussions between research partners but can also facilitate data collection, analysis and dissemination of findings. This echoes the sentiments of Bals, Lane and Mugurusi,⁵² who posit that collaboration can facilitate the sharing of knowledge, improve efficiencies and decrease costs, which are essential factors in assessing the performance of projects or organisations as a whole. Refer to Table 4 for excerpts from the interviews.

Theme four: Teaching, learning and research

This theme seems to address the level where collaboration, driven by technology in the context of higher education, impacts upon. From the interviews, it was evident that teaching and learning, as well as research were the areas that stood the most to benefit from collaborative opportunities made possible by technological advances.

In terms of teaching and learning, research participants feel that technology and collaborative arrangements are key to ensuring student success (as measured by the pass rate per module and the throughput rate per programme or qualification). With the outbreak of COVID-19 and the ensuing lockdowns, HEIs had no choice but to switch to digital platforms to keep operations going and to provide tuition to students. In the aftermath of COVID-19, these learning management systems are far more integrated into the teaching and learning 'fabric' of HEIs than they were before COVID-19 and blended learning is now almost taken for granted.

However, some research participants did mention that HEIs were not prepared and equipped at the time to switch over to, and engage in, full e-learning. To adjust to these challenges, these research participants are of the opinion that academics

TABLE 5: Extracts from the interviews on teaching, learning and research.

Participant	Statement
Participant 1	'... it becomes very, very important to figure out within the context of the teaching and learning environment, how to prepare and how do we ensure that we support the students? And technology becomes the key in that uhm ... what kind of support our students should be having uhm ... that would enable them to ... to succeed?'
Participant 3	'... they use technology uhm ... to access information so the way in which you engage in pedagogy in the class is no longer something to communicate in providing information because that information is accessible. So you have to rethink what it is, what is your role when you are engaging with students.'
Participant 14	'... adequately qualified staff in that sense of teaching and learning, it means having up to date ... uhm, and adequately furnished venues. In online and distance education it means having sustainable student support, processes, capturing systems and learner analytics. Those sustain teaching and learning quality ...'
Participant 15	'... I think that they have to continue to target third stream income sources uhm ... and partnerships with uhm ... industry uhm ... and the private sector uhm ... and in order to do that it's going to be a major driver in terms of the type of research that's going to be conducted in the higher education institutions. If universities don't produce high impact uhm ... research outputs uhm ... and they don't uhm ... have research partnerships uhm ... with industry and privates, the private sector uhm ... the kind of funding that they get uhm ... from government they not be sufficient to sustain them going forward, as you know the two primary sources of income for most higher education institutions uhm ... public higher education institutions are government subsidy and university fees ...'

would need to adjust their pedagogies to meet the requirements of the online or blended classroom, a view also forthcoming in literature.⁵³ As teaching and learning can be viewed as a core strategic driver, HEIs will thus have to reconceptualise their outlook in the new teaching and learning environment.

The research participants also reflected on research as a factor that impacts upon teaching and learning. They opined that without knowledge created through research, HEIs and teaching and learning will become irrelevant. Therefore, research needs to be of quality, of high impact and relevant to industry and societal needs. Some of the research participants were of the opinion that over and above academic research, which provides subsidy income for HEIs, contract research should also be considered as a potential source of revenue, as budget cuts for research seem inevitable. From literature, the notion of contract research is supported by Castree.⁵⁴ However, to allow for such extensive research, HEIs should enter into collaborative arrangements with industry partners and other HEIs, a sentiment encountered in literature.⁵⁵ Research participants also indicated that technology can facilitate research, and research collaboration, as also eluded to in Theme 3. Refer to Table 5 for excerpts from the interviews.

Discussion

Following from the findings presented in the previous section, the following discussion will attempt to elaborate upon technology and collaboration as strategic drivers for HEIs.

As globalisation and the VUCA environment are important and most prominent, it not only impacts the strategic intent of HEIs but also the manner in which institutions use technology and collaborative arrangements within a global or 'glocal' world. COVID-19 has forced HEIs to rethink their

purpose as educators^{44,45} and to make sense of how students are prepared for the new world of work. Furthermore, online teaching and learning platforms are transforming HEIs into virtual intellectual spaces, while collaborative arrangements serve to grow HEIs' international profile and standing, thereby making it more attractive for international staff and students.^{37,38}

Although HEIs have grappled with becoming more 4IR compliant,^{56,20} the impact of technology, the possibilities technology open up and the realities of what becoming 4IR compliant involved became a reality when the COVID-19 pandemic forced HEIs to transition to online service delivery.¹⁷ Yet, irrespective of the emphasis on technology, institutions should remain focused on innovative teaching and learning spaces and pedagogics, as this remains the cornerstone of effective teaching and learning. However, to support and further innovative learning spaces and teaching pedagogies, technology has a crucial role to play in restructuring fundamental teaching and learning methodologies,⁹ improving the student experience and improving overall student performance.²⁰ Therefore, virtual reality, augmented reality and mixed reality⁵⁷ are definite candidates for future consideration. Higher education institutions have the potential to be producers of technology, instead of merely being users of technology.¹⁹ Technology should assume a transformative focus to assist the broader society of South Africa.

Technology as an enabler of internationalisation provides students with opportunities to study from anywhere in the world.⁵⁸ Although this may be very positive, South African HEIs may feel the pinch as students choose to rather study at a credible international institution. Although it is generally accepted that online learning may be more cost-effective, HEIs should be aware of additional backend operational cost. Technology might make things easier, but the cost to implement and use the technology might, in itself, be a barrier to adoption by some segments of South African society, thereby exacerbating inequality and the digital divide.¹⁷ Advances in technology may render certain vocations absolute, which could necessitate HEIs to alter certain curriculums and syllabi, while also reflecting on the relevance of qualifications. Adversely, new opportunities will also emerge, especially in the realm of 3D printing, robotics, big data and AI.²¹ If South African HEIs use technology more effectively and understand the mechanisms and logic behind 4IR better, it might increase their preparedness to pursue socio-economic agendas more readily. According to Xu et al.,⁴⁷ one cannot ignore the impact and speed of 4IR as this will cause a shift in knowledge, power and wealth. Therefore, the 'new normal' is here today and the 'normal' going forward.

Collaboration, especially between the Global North and South, is seen as of paramount importance for HEIs.^{24,14,26} Not only do north-south collaborative arrangements present opportunities for African scholars and HEIs to connect with

institutions perceived to be of higher stature and, in so doing, boost their own reputation and stature, but it also allows institutions and academics from Europe and North America to connect with African HEIs and academics, as part of the drive from the Global North to rejuvenate African higher education.¹⁴ Collaboration, whether within or between HEIs (or with government and stakeholders), promotes people, openness, collegiality, knowledge generation, innovation, quality, sustainability, networks and collaborative spaces that are less competitive.²⁷ However, poorly considered collaborative opportunities and arrangements, as well as the inability to collaborate in multidisciplinary or interdisciplinary spaces, can potentially hinder collaboration,⁴⁹ which underscores the necessity for cross-pollination of ideas, and the co-creation of knowledge and solutions in both research and pedagogy.

Technology and collaborative arrangements have the potential to put HEIs in a position where they can indulge in 'flights of fancy' and imagine possibilities, which were hereto unattainable. The COVID-19 pandemic has proven that HEIs are capable of far more than they themselves could have imagined. It is not possible for HEIs to share modules and qualifications, serve markets and students thought impossible or impractical to reach,⁵⁹ and embark on research-related activities on a far broader scale, thereby promoting transdisciplinary, interdisciplinary and inter-institutional knowledge creation.²⁶ Electronic platforms are becoming the norm on how meetings, colloquia, workshops, public lectures and conferences at HEIs are conducted. Learning management systems are now an integral part of the fabric of an HEI, and collaborative research is enabled through e-platforms.

Recommendations and managerial implications

From what this study has brought to the fore, the following implications and recommendations are forthcoming:

- Higher education institutions should be careful not to operate in isolation, but to take advantage of increased knowledge bases that are created.
- Higher education institutions have to prioritise online and blended learning and in the process become more 4IR compliant.
- Higher education institutions have to instil innovative pedagogies and teaching and learning spaces which include virtual reality, augmented reality or mixed reality technologies and spaces. In so doing, HEIs should strive to be known as 'technology integrated teaching and learning' institutions.
- Higher education institutions should be producers of technology and leverage the transformative benefits of these technologies.
- Higher education institutions should consider to share the best online modules and qualifications that may not only to enhance teaching and learning but may also prove to be more cost effective by using pooled resources efficiently.

- South African HEIs have to prioritise collaboration with both the Global North and South to pursue multidisciplinary and transdisciplinary collaborative research opportunities. This can, in turn, enrich teaching and learning, innovation and the general student and staff experience.
- Higher education institutions should actively pursue collaborative arrangements with other institutions of higher learning and form strong partnerships to transfer knowledge, share resources and enhance research output.
- Higher education institutions have to consider joint appointments with industry but also to work closely with government to better serve all stakeholders.
- Higher education institutions have to act as collective and collaborate in support of the strategic goals for higher education in South Africa.
- Technology and collaboration should be viewed as interdependent as the one supports the other towards 4IR compliance and serving the broader socio-economic agenda of the country.

Limitations and avenues for future research

A possible limitation may lie in the relatively small sample size. Although 24 interviews were planned, 17 interviews were conducted because of the busy schedules of research participants. However, as this is within meaning saturation range,⁶⁰ it does not affect the credibility of the study but impairs the transferability of the study, as the findings of the study are not applicable to HEIs in general, but rather to the HEIs the research participants are affiliated to as well as those that they have exposure to. Although this in itself may be tantamount to a representative view, it is not implicit.

Taking this study further, it is recommended that the impact of these strategic drivers on HEIs are studied in the broader, South African and African contexts to contextualise the South African perspective better. Furthermore, future studies can be extended to include a more exhaustive list of drivers, to better understand the full impact of strategic drivers on HEIs. Thinking further than focussing on strategic drivers, future studies could also include the impact of these drivers on the business models of HEIs, especially in the wake of COVID-19.

Conclusion

South African HEIs need to rethink their strategies post-COVID-19, as COVID-19 has exposed the need for HEIs to adopt advanced technologies and become 4IR compliant to remain relevant in a 'post-COVID' world. The current environment of higher education also highlights the need for more and better collaboration, not only within institutions but also between HEIs, and with stakeholders in higher education. Both technology and collaboration are crucial in taking South African HEIs forward into a VUCA, 4IR world while still serving a pressing socio-economic national agenda.

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Data availability

The data that support the findings of this study are available on request from the corresponding author, D.R. The data are not publicly available as it could compromise the privacy of research participants.

Disclaimer

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