A Hybrid Skills Set for Automotive Organisations in South Africa and Implications for Talent Strategies

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Abstract

Exponential technological development and change pose operational and talent challenges for organisations in the South African automotive industry, making it essential to identify, source and develop skills needed for Industry 4.0 (Maisiri & Van Dyk, 2021). The purpose of this paper was to confirm a proposed Hybrid Skills Set for automotive organisations in South Africa (MacPherson, 2021) and to determine if current talent strategies used by these organisations were aligned with Industry 4.0 skills requirements. An on-line survey exploring the perceptions of 137 representatives from automotive organisations in South Africa confirmed the components of the proposed Hybrid Skills Set. Contrary to expectations, technical skills did not emerge as the most essential skill component in the Hybrid Skills Set. Conceptual, human and personal skills ranked as most important. Statistically significant relationships found among the various components of the Hybrid Skills Set attested to their interrelatedness. In addition, significant positive correlations were noted between the various skills components in the Hybrid Skills Set and the talent strategies (recruitment, selection and retention) used in these organisations, but less so for the human skills component. The results of this study have managerial implications, and specifically for the re-alignment of skills with Industry 4.0 requirements through appropriate talent strategies. The upskilling and reskilling of existing employees, and a renewed focus on attracting talent specifically targeted for Industry 4.0 are crucial for competitiveness and survival.

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1. Introduction

1.1. Background

Industry 4.0 technologies have given rise to sophisticated operational processes and accelerated production in a new world of work, characterised by smart factories (Schwab, 2016), innovation (Calitz et al., 2017), quality management (ABB Robotics, 2018), alternative job creation (Allen, 2017) and competitiveness (Phillips, 2018). Keywell (2017) states that for continued competitiveness organisations have to adopt advanced technologies, while the author also cautions that this transformation should go hand in hand with the empowerment of employees. As such, organisations that seek to remain participants in Industry 4.0 need to ensure they have employees with the necessary skills and talent, with the HRM function being integral to the overall business strategy in pursuit of organisational success (Maisiri & Van Dyk, 2021).

The quest for talent is one of the biggest HR related challenges for organisations, especially in the automotive sector, as a general shortage of talent impedes a constructive and dynamic response to the demands of Industry 4.0 (Maisiri & Van Dyk, 2021). In the automotive industry, and specifically in South Africa, a sluggish response to securing talent for Industry 4.0 is influenced by slow economic development, the traditional employment of 'cheap' labour on the factory floor, a lack of infrastructure, high numbers of unskilled employees and a general lack of talent (MerSETA, 2018; Le Guern, 2017; Li, 2017). Li (2017) for example, states that African governments will have to drastically promote the development of digital skills among the youth to ensure a pipeline of talent for the future. Future employees will be required to work seamlessly with sophisticated robots to deliver products that meet unique customer preferences, and therefore a realignment of talent strategies for Industry 4.0 is required.

As the second largest employer in the country, the South African automotive industry plays a vital role in the country's economy. For the 2020/2021 annual period, automotive organisations invested more than eight billion dollars in the industry (Martin, 2022). Despite these investments, the industry is still characterised by large numbers of unskilled and semi-skilled employees (MerSETA, 2018; Phillips, 2018; Calitz et al., 2017). The results of an Accenture Report released in 2018 (Phillips, 2018) showed a mismatch between the demand and supply of key work-related skills, with 38% of employers surveyed citing difficulties in filling jobs. It emerged that South Africa possessed only 16% of the skills needed to meet Industry 4.0 demands. In addition, a Deloitte (2020) study highlighted a widening gap between emerging Industry 4.0 jobs and the availability of a suitably skilled talent pool. Considering the ambitious 2035 vision of the South African Automotive Master Plan (SAAM), the development of technical and associated skills in line with industry transformation goals remains a main priority (MerSETA, 2018).

In the automotive industry, the adoption of Industry 4.0 technologies manifests as a union between employees and emerging technologies, which include robotics, artificial intelligence and the Internet of Things (Calitz et al., 2017). Collaborative robots are designed for effective and seamless interaction with employees to reach a high level of perfection. Calitz et al. (2017), who conducted a study among IT professionals and managers in automotive organisations in South Africa, found that employees who had to collaborate with robots experienced challenges including a lack of pre-training, fear of redundance, lack of motivation, a lack of soft skills and little knowledge of collaboration. The results of the study highlighted a need to prepare employees for change and for ensuring that they have the right kind of skills to cope with the requirements of the new world of work. In the Employee Index Report, as released by the World Economic Forum (2019), South Africa scored 3.9 out of 7 for finding skilled employees, and 4.5 out of 7 for developing employees, demonstrating the talent strategy challenge in the country. In response to the challenges posed by Industry 4.0, the Department of Trade and Industry, Government Gazette - 11 April 2017, instituted the National Integrated Human Resource Development (NIHRD) Plan (HRDC, 2017) to provide guidelines for a responsive and demand-driven approach to human development. The revised plan is evidence of disparities in HR methods adopted to deal with Industry 4.0 skills and talent challenges. The government has committed to strengthening basic education and foundation programmes in STEM, expanding access to quality post-school education and training, improving research and technological innovation while producing appropriately skilled people for the economy.

A report by Deloitte (2020) indicated that mindsets in manufacturing were not yet focused on finding solutions for Industry 4.0 challenges, and there were still a surprisingly high number of technology averse people in the industry. The report highlighted that without a changed mindset, it would be difficult to escalate the training and retraining of the workforce to enable them to understand and work with smart technologies. As such, talent management becomes an additional challenge for organisations in the automotive sector. In the context of this study, talent management refers to purposeful development and implementation of integrated strategies for the attraction, development and retention of workers to meet the skills' needs of Industry 4.0 automotive organisations (Irudayaraj, 2018). To date, there is a paucity of research that focuses on Industry 4.0, and specifically on the skills required in the automotive sector, and appropriate talent strategies to ensure a continuous supply of talent. To this end, Maisiri and Van Dyk (2021) emphasised the need to identify skills that are important for Industry 4.0 in the South African context.

1.2. Problem Statement

Industry 4.0 is a technological phenomenon that is rapidly changing the world. In pursuit of competitiveness, the South African automotive industry is also part of this trend. In 2020 and 2021,

South African vehicle manufacturers invested more than eight billion dollars to introduce Industry 4.0 technologies (Martin, 2022). While skills and talent are accentuated as the main drivers of success in Industry 4.0, there is an over-supply of young people without the necessary education and skills to fulfil key functions in automotive organisations in South Africa (Maisiri, Darwish & Van Dyk, 2019; Laugsand, 2017; Li, 2017). The revision of the National Integrated Human Resource Development (NIHRD) plan was an attempt by the Department of Trade and Industry in response to these negative reports, to build capacity to meet Industry 4.0 demands as well as take advantage of the opportunities presented by Industry 4.0 (HRDC, 2017). In the 2023 Global Talent Shortage Report, the ManpowerGroup (2023) indicated that 76% of employers in South Africa reported difficulties in filling jobs, which casts doubt on the ability of South African organisations to successfully navigate Industry 4.0, even if they purposefully pay attention to talent procurement, development and retention. In addition to the above, the report issued by ManpowerGroup (2023) stated that 71% of employers reported the upskilling and reskilling of their current workforce as a main priority. A study conducted by Nkunzi (2014) showed that South African organisations struggled in terms of employing, developing and retaining employees with the required competencies, a challenge linked to talent management (Maisiri, Darwish & Van Dyk, 2019).

Previous research established that a hybrid set of skills was required in the context of Industry 4.0 (Schwab, 2018; Bersin et al., 2010; Katz, 1955). Drawing from these studies, a Hybrid Skills Set is defined as a combination of conceptual, technical, human and personal skills. MacPherson (2021), in pursuit of identifying skills requirements related to Industry 4.0 in South Africa specifically, conducted a mixed-method study and developed a Hybrid Skills Set for automotive organisations in South Africa. In the first phase of the study, interviews were conducted with 10 managers and 10 HR practitioners representing 10 different automotive organisations (MacPherson, 2021; MacPherson et al., 2022). Based on their work experiences, the interviewees identified job categories and skills that they observed were emerging in the automotive sector. It was found that the responses from these interviewees were congruent with an analysis of job advertisements posted for the automotive sector within South Africa over the span of one year. These advertisements reflected jobs involving robotics, automation, programming, quality control and technical/electrical acumen, and gave a good indication that automotive organisations were embracing Industry 4.0 technologies. In the second phase of the study, reported in this paper, an on-line survey using convenience sampling was conducted among representatives from automotive organisations to test the appropriateness of the proposed Hybrid Skills Set for automotive organisations in South Africa (MacPherson, 2021).

Questions addressed in this paper relate to the appropriateness of the identified Hybrid Skills Set, the relative importance of each of the skills components, and in addition, whether talent strategies used by these organisations were in consideration of these skills. This study makes a contribution to the field

of knowledge of HR in terms of what constitutes talent in automotive organisations in South Africa in the context of Industry 4.0, with implications for talent management strategies.

1.3. Research Objectives

The primary objective of this study was to test the appropriateness of a proposed Hybrid Skills Set and its associated skills components, specifically for automotive organisations in South Africa within the context of Industry 4.0. An objective was therefore also to determine whether Talent Strategies related to recruitment, development and retention used in the automotive organisations were aligned with the Hybrid Skills Set. Furthermore, based on the results, it was important to identify managerial implications and make recommendations.

2. Literature Review

The literature review focuses on the three main aspects: Industry 4.0, a Hybrid Skills Set and Talent Strategy.

2.1. Industry 4.0 and human-machine collaboration

According to Nasution (2020), the concept of Industry 4.0 refers to a trend in automation based on the use of real time data in pursuit of satisfying changing customer preferences and demands, giving rise to the development of smart factories based on computer-aided design. This in turn enables the use of artificial intelligence and machine learning, as well as the implementation of the Internet of Things to integrate and monitor all operational processes, robots and machines (Nasution, 2020). Industry 4.0 is characterised by human-robot collaboration (Acemoglu & Restrepo, 2018). It is suggested that human-robot collaboration reduces idle time by 85%, leading to high efficiency gains (Tobe, 2015). It further reduces errors, advances quality, enables the utilisation of sophisticated intelligence and facilitates flexibility (Selamat et al., 2017). Human-robot collaboration also promotes team cohesiveness, improvisation, rapid detection and perception, as well as power and precision as standard practice (Li, 2017). In addition, this type of collaboration improves safety, leaving employees to use higher-order cognitive processing skills while the machines execute potentially dangerous work in handling parts and machines (Masinga et al., 2015).

South Africa is still facing many practical challenges related to Industry 4.0 (Laugsand, 2017). One of the reasons is that, traditionally, South Africa relied very much on being a resource-based country while skills are of paramount importance in Industry 4.0 (Baker, 2016). The emergence of Industry 4.0 places a huge responsibility on the South African automotive industry and its manufacturing function as a vital global player (Calitz et al., 2017). Nasution (2020) emphasises that Industry 4.0 is not only about

technology, but due to a revolution in production, manufacturing and industry, the upskilling and reskilling of the workforce through training and education is of paramount importance.

Therefore, developing the necessary skills set to operate optimally in a real time data-driven context and having the expertise to manage in this environment, are developmental game changers in Industry 4.0 (Schwab, 2018). In Industry 4.0, staying abreast of things is getting tougher and more challenging due to ever-changing market demands. Therefore, as the largest producer of motor vehicles in Africa, the automotive industry in South Africa should embrace Industry 4.0 technologies and create value through modernising traditional production processes (LeCun, 2019), while ensuring the right skills sets are available (Maisiri, Darwish & Van Dyk, 2019). From a South African perspective, against the backdrop of apartheid that resulted in political instability, a lack of education, a shortage of technological skills and subsequent slow growth of the automotive sector (Nkunzi, 2014), these organisations are faced with the challenge of an ageing workforce, accelerated technology advancement, a greater need for robotic training, and reluctance or fear of employees to update their skills (Macpherson, 2021).

2.2. A Hybrid Skills Set

Success in Industry 4.0 is dependent on a workforce with the right set of skills (Schwab, 2018; Bersin et al., 2010; Katz, 1955). A seminal researcher, McClelland (1973), identified three types of workplace skills which included technical, conceptual and human skills, which he then incorporated into a "Three-Skill Approach". The concept of a Hybrid Skills Set is associated with Industry 4.0 and refers to a skill set divided into four types of skills: technical, conceptual, human and personal (Doyle, 2019; Schwab, 2018; Berger, 2016). The idea of a hybrid skills set implies that, in the workplace, these skills are intertwined and interrelated. As such, in Industry 4.0, employees are required to possess the Hybrid Skills Set inclusive of all four types of skills. Interviews conducted with HR and line manager representatives from automotive organisations in South Africa highlighted collaboration, troubleshooting, effective communication, swift decision-making, and critical thinking as critical skills for human-robot collaboration in the automotive industry (Macpherson, 2021; Macpherson et al, 2022).

Technical skills reflect on an employee's ability to display their capabilities and knowledge to perform their duties while conceptual skills reflect on their ability to apply their mind when performing such duties. Human skills, however, reflect on an employee's ability to effectively collaborate with others and personal skills relate to the ability to adapt to change (Kwinana, 2010). The ManpowerGroup (2023) reported that in 2023, globally, automotive and logistics employers perceived self-discipline, resilience and adaptability, creativity and originality, leadership and social influence, and reasoning and problem solving, as the most important human strengths required in a digital era.

For the successful adoption of Industry 4.0, a Hybrid Skills Set is vital as employees need to use their skills to generate tangible and intangible values (Maisiri, Darwish & Van Dyk, 2019; Baker, 2016). All four components of the Hybrid Skills Set are vital in the automotive industry where employees have to collaborate with robots and are required to have a positive mindset, understand operational processes, think strategically, and know how to manage the interpersonal aspects of the job (Calitz et al., 2017). Schwab (2018) postulates that employees with a Hybrid Skills Set can leverage their skills to ensure a greater competitive advantage for organisations. For sustainability of the automotive industry, the development of skills is imperative (Laseinde & Kanakana, 2017). According to these authors, even though notable efforts had been made in terms of upskilling employees through learning centres and specialised development centres, amongst others, SA was still struggling to keep up with global competition in the face of constant change.

2.3. Talent Management Strategy

Procuring and developing skills, and retaining talent, are the building blocks of a talent management strategy. Michaels, Handfield-Jones and Axelrod (2001), who did seminal work on talent management, define talent management as an all-inclusive approach consisting of integrated activities (recruiting, developing and retaining employees) to ensure that the right person is in the right position at the right time. Talent refers to employees who can make a meaningful contribution to the strategic goals of an organisation, whereas talent management involves workforce planning with the aim of attracting, developing and retaining talent (Al-Dalahmeh, 2020). In this study, talent is defined based on a Hybrid Skills for the automotive industry in South Africa as identified by Macpherson (2021). Although a Talent Management strategy is typically developed using a range of factors, the uniqueness of the working environment should be considered (Bussin, 2014). The strategy should ultimately ensure that organisations always have access to talent in both a qualitative and quantitative manner to effectively carry out organisational operations and strategy. As such, when recruiting and developing employees, it should be done purposively to meet the skills requirements of the organisation in relation to changes in the external environment. In this respect, Nicolás-Agustín and Jiménez-Jiménez (2021), in a study involving 184 manufacturing organisations, confirmed the importance of human resources practices, such as training, in meeting the digital transformation of organisations. These authors indicate that employees with innovation-oriented behaviours are more likely to adjust in a digital environment since they will learn faster, assimilate changes and solve digital-related problems more effectively. As such, talent strategies, such as recruitment and selection, and skills development, should be aligned with the talent needs of an organisation.

The ManpowerGroup (2023) which regularly surveys employers across the world, identified four legs of a holistic talent strategy. These are build, buy, borrow and bridge. Build implies investing in learning

and development to ensure a talent pipeline, buy refers to attracting talent, borrow denotes cultivating communities of talent outside the organisation, and bridge points to supporting employees in their career journey. This is a framework that South African organisations could follow to address the talent challenges of Industry 4.0. It is suggested that organisations in South Africa should collaborate with other organisations and training institutions, share talent pools, effectively attract Industry 4.0 talent, appoint employees purposefully, and offer employees an attractive Employee Value Proposition (EVP) (Mzezewa, 2019; Bersin et al., 2010). This implies a collaborative multi-stakeholder approach for strengthening the organisation's talent pool and talent pipeline, adopting inclusive and exclusive strategies for managing talent, encouraging life-long learning, offering purposeful training and development, and articulating a powerful vision to guide behaviour (Boyko, 2014; Knox, 2013). Schwab (2018) claims the war for talent is on-going, therefore, an attractive talent retention strategy should include carefully planning for human resources, effectively rewarding employees, mapping competencies, securing Industry 4.0 talent, and focusing on retaining, especially knowledge workers (Ncube, 2018; Bussin, 2014). Strategies used for talent management within the automotive industry in South Africa include apprenticeships, orientation programmes, succession planning, training centres, and performance management (Macpherson, 2021).

3. Research Methodology

A positivistic research paradigm and quantitative research approach were adopted to explore perceptions about the appropriateness of the proposed Hybrid Skills Set for automotive organisations in South Africa, the interdependence of its components, and whether talent strategies used by automotive organisations in South Africa were aligned with Industry 4.0 talent needs. To this end, an online self-developed questionnaire was administered from the QuestionPro platform and distributed amongst potential respondents, who were invited via e-mail, WhatsApp and LinkedIn. The research instrument contained two Likert-type scales, the Hybrid Skills Set Scale and the Talent Strategy Scale, both ranging from strongly disagree (1) to strongly agree (5). Respondents had to indicate the extent to which they perceived selected skills as vital for operations in their respective automotive organisations within the context of Industry 4.0, and the extent to which their organisations adopted selected talent management strategies.

The Hybrid Skills Set scale was developed from the work of Doyle (2019), Schwab (2018), Keywell (2017), Berger (2016), Mackenzie (2015), Kwinana (2010) and Katz (1955). The Hybrid Skills Set scale includes 37 items that measure the importance of technical skills, Conceptual skills, Personal skills and Human skills. Examples of Technical Skills items are *knowledge of the production system*, *coding*, *troubleshooting*, *quality control*, *artisan skills*, *robotic programming*, and *engineering*. Examples of Conceptual Skills items include *creativity*, *critical thinking*, *swift problem solving* and *analytical skill*.

Personal Skills items include *building trusting relationships*, *stress management* and *change management skills*. Human skills items include *emotional intelligence*, *communication skills* and *the ability to transfer knowledge*. The reliability of the scale was confirmed by a Cronbach coefficient of 0.92 (Table 1), which can be considered as excellent (Gravetter & Wallnau, 2009).

The Talent Strategy scale used was developed from the work of Ncube (2018), Phillips (2018), Schwab (2018), Babshet (2017), Le Guern (2017), Spiesshofer (2017) and Bersin et al. (2010) and consists of 16 items measuring talent strategies related to talent recruitment, development and retention within the industry 4.0 context. Examples of recruitment strategy items include *collaborates with other organisations to obtain Industry 4.0 talent, collaborates with academic institutions to obtain Industry 4.0 talent*, *shares a talent pool*, and *purposefully appoints people with potential to learn and grow*. Developing talent strategy items include *the organisation being serious about training/developing talent for the adoption of robots*, *regularly conducting talent audits*, *using performance management effectively* and *encouraging lifelong learning*. Retaining talent strategy times include *being in possession of talent required by the technological advancements associated with Industry 4.0*, *planning for talent*, *competency mapping*, *promoting the retention of knowledgeable employees*, and *rewards for talent*. The reliability of the scale was confirmed by a Cronbach coefficient of 0.93 (Table 1).

The target population for this study was drawn from automotive organisations in the South African automotive industry. Non-probability, and specifically convenience sampling was used (Malhotra, 2010). Written communication shared with prospective participants included the purpose of the study, voluntary participation, as well as anonymity and the right to withdraw from the study.

Using QuestionPro, the data collected was automatically captured on a web-based spreadsheet. Descriptive statistics utilised for reporting included measures of central tendencies. The Pearson product moment correlation was used to determine relationships among the skills in the Hybrid Skills Set, and between the Hybrid Skills Set and Talent Strategy. Thereafter, Chi-square tests were used to determine the levels of independency among the factors, and where independence could not be established, Cramer's V was used to determine the strength and practical significance of relationships.

The questionnaire was viewed by 526 potential participants, with 162 attempts. Of these, 137 questionnaires were completed and identified as useable for data analysis, thus providing a response rate of 26%. Most of the 137 respondents (91%) were from the Eastern Cape Province, with 43% working for large organisations (employing more than a 1000 employees) and 47% working for motor vehicle assemblers. Most respondents were in a position of leadership, with 29% in senior and middle level management, 11% on supervisory level, 21% team leaders, while 39% were employees. Of the

respondents, 60% were in production/operations, while 64% of the respondents indicated that operations were automated to some extent.

3.1 Ethics

The researchers followed ethics protocols and obtained ethics clearance from the Nelson Mandela University with number: H19-BES-HRM-010. The survey was accompanied by an informed consent form detailing the purpose of the study, the right of withdrawal and the anonymity of responses.

4. Results and Findings

Table 1 presents descriptive statistics obtained for Hybrid Skills Set and Talent Strategy factors.

Table 1: Descriptive statistics for Hybrid Skills Set and Talent Strategy

Factor	Number of items	Cronbach alpha	Mean scores	Standard deviations
Hybrid Skills Set				
Technical Skills	11	0.70	3.96	0.70
Conceptual Skills	12	0.93	4.08	0.65
Human Skills	7	0.91	4.14	0.68
Personal Skills	7	0.92	4.29	0.67
Hybrid Skills Set: Total	**237**	**0.92**	**4.12**	**0.61**
Talent Strategy				
Attracting Talent	4	0.79	3.28	0.83
Developing Talent	6	0.89	3.41	0.89
Retaining Talent	6	0.89	3.26	0.93
Talent Strategy: Total	**16**	**0.93**	**3.32**	**0.83**

The Cronbach alpha coefficients for both the Hybrid Skills Set and Talent Strategy factors ranged between 0.70 and 0.93, which is considered good to excellent and confirms reliability (Gravetter & Wallnau, 2009). The responses indicated agreement in terms of the Hybrid Skills Set, with mean scores ranging between 3.96 (Technical Skills) and 4.29 (Personal Skills), with relatively low standard deviations, ranging between 0.61 and 0.70. There was less agreement in terms of Talent Strategy, with mean scores ranging between 3.26 (Retaining Talent) and 3.41 (Developing Talent). The standard deviations, being 0.79 and 0.89, showed relative consistency in the responses received.

Inferential statistics

Ranking was used to determine the relative importance of the skills in relation to each other. Table 2 ranks the skills in the Hybrid Skills Set, based on mean scores obtained.

Table 2: Inferential ranking in terms for Hybrid Skills Set

Factor	Mean scores	Standard deviations	Rank	Significant Group
Personal Skills	4.29	0.67	1	1
Human Skills	4.14	0.68	2	1
Conceptual Skills	4.08	0.65	3	1
Technical Skills	3.96	0.70	4	2

Overall, the Hybrid Skills Set, as measured in the industry 4.0 automotive organisations that were surveyed in this study, received confirmation. Personal Skills (mean 4.29), Human Skills (mean 4.14) and Conceptual Skills ranked first, second and third respectively and were identified as the first significant group. Interestingly, Technical Skills, with a lower mean score (3.96) was ranked second in terms of significant group.

Table 3 presents the Pearson product moment correlation analysis results for the Hybrid Skills Set and Talent Strategies.

Table 3: Pearson product moment correlation results

FACTOR	Technical Skills	Conceptual Skills	Human Skills	Personal Skills	Hybrid Skills Set
Technical Skills	-	**.750**	**.715**	**.683**	**.882**
Conceptual Skills	**.750**	-	**.765**	**.695**	**.894**
Human Skills	**.715**	**.765**	-	**.802**	**.917**
Personal Skills	**.683**	**.695**	**.802**	-	**.888**
Hybrid Skills Set	**.882**	**.894**	**.917**	**.888**	-
Retaining Talent	**.363**	**.316**	.183	.265	**.314**
Developing Talent	**.412**	**.391**	.281	**.321**	**.392**
Attracting Talent	**.344**	**.394**	.259	**.307**	**.363**
Talent Strategy	**.398**	**.389**	**.255**	**.316**	**.379**

For n = 137, at an alpha level of 0.05, correlations are statistically significant at .104, and statistically and practically significant at r > = .300 (Gravetter & Wallnau, 2009). The results indicate that all of the correlations are positive and statistically significant (minimum r = .177 and a maximum r = .951). With the exception of Human Skills, all of the factors in the Hybrid Skills Set show a practical significant correlation with the Talent Strategy. These results suggest that even though Human Skills are considered an important skill in the Hybrid Skills Set, there is misalignment with how important this skill is perceived in terms of the Talent Strategy. The results reveal that the talent strategies used by the automotive organisations reflect the Hybrid Skills, even though lessor so for the Human Skills component.

Chi-square test for Hybrid Skills Set and Talent Strategy factors

Due to the relationships observed amongst the factors of the Hybrid Skills Set and those of the Hybrid Talent Strategy, Chi-square tests were performed to determine the level of independence between variables (Cassim, 2011). Understanding the level of dependence among the skill factors have implications for the talent strategies used. Chi-square tests the hypothesis that the row and column variables in a categorical tabulation are independent. For the Chi-square to be used effectively, no cell should have a value less than 0, and no more than 20% of the cells should have values less than 5. Such cases should be interpreted with caution (Saunders & Lewis, 2018). If an association is found between variables, Cramer's V is used to determine the strength of the relationship. Tables 4 to 12 indicate the cross tribulation of the factors of this study.

Table 4 shows the Chi-square test of independence between Conceptual Skills and Technical Skills.

Table 4: Chi-square test of independence between Conceptual Skills and Technical Skills

Technical Skills	**Conceptual Skills**							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	23	68%	9	26%	2	6%	34	100%
Middle Q1-Q3	11	16%	48	70%	10	14%	69	100%
Higher > Q3	0	0%	12	35%	22	65%	34	100%
Total	34	25%	69	50%	34	25%	137	100%
Chi^2 (d.f. = 4; n = 137) = 75.87; $p < .0005$; V = 0.53 Large								

Table 4 indicates a statistically significant relationship of large effect (Cramer's V = 0.53) between Conceptual Skills and Technical Skills ($p < .0005$, Chi-square = 75.87, d.f. = 4). Due to the observed association, it can be concluded that in the context of Industry 4.0, these skills are not independent of each other, but are related.

Table 5 indicates the results for the Chi-square test of independence of Human Skills and Technical Skills.

Table 5: Chi-square test of independence between Human Skills and Technical Skills

Technical Skills	**Human Skills**							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	20	59%	14	41%	0	0%	34	100%
Middle Q1-Q3	16	23%	42	61%	11	16%	69	100%
Higher > Q3	2	6%	11	32%	21	62%	34	100%
Total	38	28%	67	49%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 53.59; $p < .0005$; V = 0.44 Large								

Table 5 shows a statistically significant relationship between Human Skills and Technical Skills ($p < .0005$, Chi-square = 53.59, d.f. = 4). This relationship is of practical importance with a large effect (Cramer's V = 0.44).

Table 6 presents the Chi-square test of independence between Personal Skills and Technical Skills.

Table 6: Chi-square test of independence between Personal Skills and Technical Skills

Technical Skills	Personal Skills							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	18	53%	15	44%	1	3%	34	100%
Middle Q1-Q3	12	17%	44	64%	13	19%	69	100%
Higher > Q3	0	0%	16	47%	18	53%	34	100%
Total	30	22%	75	55%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 44.55; $p < .0005$; V = 0.40 Large								

Table 6 indicates that a statistically significant relationship exists between Personal Skills and Technical Skills ($p < .0005$, Chi-square = 44.55, d.f. = 4), with large practical significance (Cramer's V = 0.40).

Table 7 indicates the Chi-square test of independence between Human Skills and Conceptual Skills.

Table 7: Chi-square test of independence between Human Skills and Conceptual Skills

Conceptual Skills	Human Skills							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	21	62%	13	38%	0	0%	34	100%
Middle Q1-Q3	17	25%	43	62%	9	13%	69	100%
Higher > Q3	0	0%	11	32%	23	68%	34	100%
Total	38	28%	67	49%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 68.73; $p < .0005$; V = 0.50 Large								

The results in Table 7 indicate a statistically significant relationship of large effect (Cramer's V = 0.50) between Human Skills and Conceptual Skills ($p < .0005$, Chi-square = 68.73, d.f. = 4), which allude to the relevance of both these skills moving forward in Industry 4.0.

Table 8 indicates the Chi-square test of independence between Personal Skills and Conceptual Skills.

Table 8: Chi-square test of independence between Personal Skills and Conceptual Skills

Conceptual Skills	Personal Skills							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	20	59%	12	35%	2	6%	34	100%
Middle Q1-Q3	10	14%	52	75%	7	10%	69	100%
Higher > Q3	0	0%	11	32%	23	68%	34	100%
Total	30	22%	75	55%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 79.32; $p < .0005$; V = 0.54 Large								

Table 8 shows that a statistical association exists between Personal Skills and Conceptual Skills ($p < .0005$, Chi-square = 79.32, d.f. = 4), with a large practical relationship (Cramer's V = 0.54).

Table 9 presents the Chi-square test of independence between Personal Skills and Human Skills.

Table 9: Chi-square test of independence between Personal Skills and Human Skills

Human Skills	Personal Skills							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	25	66%	13	34%	0	0%	38	100%
Middle Q1-Q3	4	6%	55	82%	8	12%	67	100%
Higher > Q3	1	3%	7	22%	24	75%	32	100%
Total	30	22%	75	55%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 113.89; $p < .0005$; V = 0.64 Large								

The results from Table 9 show a statistically significant relationship between Personal Skills and Human Skills ($p < .0005$, Chi-square = 113.89, d.f. = 4) that is also practically significant (Cramer's V = 0.64).

The Chi-square tests performed on the Hybrid Skills Set factors confirmed the Hybrid Skills Set for automotive industries embracing Industry 4.0, due to the strong associations found among these factors. The same inferential statistics were performed on the data obtained for the Talent Factors.

Table 10 indicates the Chi-square test of independence for variables measuring Attracting Talent and Developing Talent.

Table 10: Chi-square test of independence between Attracting Talent and Developing Talent

Developing Talent	Attracting Talent							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	20	59%	13	38%	1	3%	34	100%
Middle Q1-Q3	11	15%	50	68%	13	18%	74	100%
Higher > Q3	2	7%	9	31%	18	62%	29	100%
Total	33	24%	72	53%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 55.99; $p < .0005$; V = 0.45 Large								

Table 10 shows a statistically significant relationship between Attracting Talent and Developing Talent ($p < .0005$, Chi-square = 55.99, d.f. = 4), with a practical relationship of large significance (Cramer's V = 0.45). As such, there is a strong association between Attracting Talent and Developing Talent.

Table 11 presents the Chi-square test of independence between Attracting Talent and Retaining Talent.

Table 11: Chi-square test of independence between Attracting Talent and Retaining Talent

Retaining Talent	Attracting Talent							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	22	59%	15	41%	0	0%	37	100%
Middle Q1-Q3	11	16%	49	72%	8	12%	68	100%
Higher > Q3	0	0%	8	25%	24	75%	32	100%
Total	33	24%	72	53%	32	23%	137	100%
Chi^2 (d.f. = 4; n = 137) = 88.35; $p < .0005$; V = 0.57 Large								

Table 11 indicates a significant relationship of large effect (Cramer's V = 0.57) between Attracting Talent and Retaining Talent (p < .0005, Chi-square = 88.35, d.f. = 4).

Table 12 indicates the Chi-square test of independence between Developing Talent and Retaining Talent.

Table 12: Chi-square test of independence between Developing Talent and Retaining Talent

Retaining Talent	Developing Talent							
	Lower < Q1		Middle Q1-Q3		Higher > Q3		Total	
Lower < Q1	24	65%	11	30%	2	5%	37	100%
Middle Q1-Q3	10	15%	51	75%	7	10%	68	100%
Higher > Q3	0	0%	12	38%	20	63%	32	100%
Total	34	25%	74	54%	29	21%	137	100%
Chi^2 (d.f. = 4; n = 137) = 79.82; $p < .0005$; V = 0.54 Large								

Table 12 shows a statistically significant relationship between variables for Developing Talent and Retaining Talent (p < .0005, Chi-square = 79.82, d.f. = 4), with large practical significance (Cramer's V = 0.54).

5. Discussion

The study provides valuable insights into the impact of the emergence of Industry 4.0. Industry 4.0 presents a demand for skills of employees and talent strategies for a consistent supply of talent, specifically in the context of operational automotive professionals who are required to collaborate with robots while performing duties. The paper reports on the appropriateness of a Hybrid Skills Set for Industry 4.0 requirements and implications for talent strategies in automotive organisations in South Africa.

Various reports of Phillips (2018), Calitz et al. (2017), Le Guern (2017) and Li (2017), reveal that the emergence of Industry 4.0 poses challenges for talent procurement in the South African automotive industry. These challenges are preceded by an absence of infrastructure, a lack of education and skills,

high numbers of unskilled employees, and a talent deficit. Challenges faced by employees in this context include a dearth of training, fear of redundance, low levels of motivation, a lack of soft skills, and little knowledge pertaining to collaboration. MacPherson (2021) and Vaidya et al. (2018) indicate that the above challenges impact employee behaviour resulting in low levels of motivation, increased sensitivity, resistance to change, and fear and anxiety in the face of possible retrenchment.

The results of the study confirm the Hybrid Skills Set as high means scores were obtained for all of the components of the Hybrid Skills Set. The highest means scores were obtained for Personal Skills (4.29) and Human Skills (4.14), while the lowest score surprisingly was obtained for Technical Skills. It could be speculated that the respondents already observed a visible supply of employees with technical skills in an automated context, and they felt there was still room for employees to demonstrate conceptual, human and personal skills. The results could also reflect some fear about technological skills becoming dominant, therefore the slightly higher emphasis placed on the other skills. Irrespective, the low standard deviations for the components of the Hybrid Skills Set, ranging from 0.65 to 0.70, suggest that the respondents had congruent perceptions about an all-inclusive Hybrid Skills Set in Industry 4.0 automotive organisations. The inferential ranking confirmed the notion that in Industry 4.0, a Hybrid Skills Set is needed if employees wish to remain employable and add the much-desired competitive advantage in organisations.

Schwab (2018) emphasises that employees with a Hybrid Skills Set can collaborate much better with other employees, as well as their technological counterparts in an environment where work is required to be meaningful and add value to the organisation. Doyle (2019) agrees that when integrating all of the components of the Hybrid Skills Set when filling vacancies, automotive organisations will be in a better position to attract talented employees. The results therefore have implications for HR recruiters in that they need to place emphasis on all the components of the Hybrid Skills Set when filling vacancies as Industry 4.0 has closed the gap in terms of the importance of a Hybrid Skills Set.

Considering the results obtained for the relevance of the Hybrid Skills Set, it is concerning that the mean scores for the Talent Strategy lean toward neutral responses. It is especially notable that Retaining Talent obtained the lowest mean score (3.26) in comparison to Developing Talent (3.41) and Attracting Talent (3.28). This result could signal that the respondents perceived that talent management did not receive the necessary attention required in relation to Industry 4.0. The results do, however, indicate that that more attention was given to developing current employees than attracting talent. This finding is underscored by a finding of the World Economic Forum (2019) that South Africa is struggling to recruit talented individuals and places more emphasis on developing staff than recruiting people. With the war for talent continuing, these results are concerning because an effective talent strategy is a major contributor to organisational competitiveness (Barkhuizen & Masale, 2022).

The Chi-square test of independence results refuted the hypothesis of independence among the factors and indicated significant strong relationships between all the components of the Hybrid Skills Set and also those of the Talent Strategy. These results reinforce the statement by Bussin (2014) that in Industry 4.0, no single organisational activity can stand alone, but rather that all employee related activities need to be holistically integrated. The correlation analysis confirmed a positive significant relationship between the Hybrid Skills Set and the Talent Strategy utilised by automotive organisations in South Africa. This finding demonstrates that, from an HR and organisational perspective, the importance of these skills coincides with more attention being given to talent recruitment and development, but less so for retention. This finding is supported by Keywell (2017) who calls for an all-inclusive Hybrid Skills Set for operating effectively in the automated automotive industry. This also means that talented employees must be drawn to the organisation, their skills must be further developed and updated, and they need to be retained for ensuring continued organisational success. Baker (2016) agrees that in Industry 4.0, talent is vital for successfully adopting emerging technology. As such, employees with a Hybrid Skills Set who are continuously developed and retained, stand to deliver maximum returns to organisations.

One could therefore conclude by stating that there is an important link between the Hybrid Skills Set and the utilised Talent Strategy in Industry 4.0, therefore, attracting skilled employees and developing them further should be of great importance for the automotive industry.

6. Managerial Implications

Both the theoretical and empirical findings of this study highlight Industry 4.0's call for talent with a Hybrid Skills Set, and specifically also in relation to automotive organisations in South Africa. Due to the rapid development of technology, the use of robotics in manufacturing and the potential of artificial intelligence, managers may tend to put more emphasis on technological skills when recruiting and developing employees at the expense of a hybrid skills set that incorporates technical, conceptual, human and personal skills. With the evolution towards Industry 4.0 employees' mindsets have to shift towards value stream and systemic thinking, collaboration with cobots and virtual associates, trouble shooting and quality control, and these are changes that managers need to consider when defining, recruiting and developing talent.

Therefore, HR managers and line managers are compelled to give adequate attention to the attraction, development and retention of talent. Industry 4.0 is disrupting existing business models and redefining all organisational processes (World Economic Forum, 2019), which include talent management processes.

As an agent of change, HR practitioners are important stakeholders in the procurement of Industry 4.0 talent. It could be reasoned that a change management process is required to reposition talent strategies for Industry 4.0. This will require the development of a change management plan, revisiting existing talent management strategies, and introducing upskilling and re-skilling opportunities for existing employees. Aspects such as workforce planning, skills development planning, career planning, and workplace skills planning should be incorporated into the career management plans of employees. These should also be frequently communicated to all employees to avoid uncertainty. For example, in Industry 4.0 organisations cannot simply want to fill positions but need to be cognisant of the importance of a Hybrid Skills Set. New recruits should be tested to determine the extent to which they already possess the technical, human, personal and conceptual skills, and their potential to develop these skills further for continuous talent development. In addition, when planning training and development, the interdependence of the components of the Hybrid Skills Set should be considered. As such, technical skills cannot be developed in isolation from the other types of skills. The integration of the different skills should become an objective of training, and in this respect, training should take place in environments that simulate the work situation and challenge systemic thinking and problem solving. Alternatively, training should be done within the work environment, with explicit focus on developing the various competencies in relation to each other. Employees should be made aware of the importance of the competencies so that they can have agency in their own development.

The results of the study have further implications for organisational leaders as the South African automotive industry workforce is characterised by relatively low education levels and a dearth of technical skills. Automotive organisations need to collaborate with educational institutions and other organisations in the industry, both nationally and internationally to ensure effective reskilling and upskilling of current employees and a future-fit talent pipeline. The adoption of Industry 4.0 should, therefore, be managed through multi-stakeholders HRM to identify the skills and talent requirements of Industry 4.0. This will assist in the supply of such requirements. Therefore, it is proposed that the adoption of new technologies should be a people-first initiative. This can provide relief for employees who may fear redundancy and ensure openness to technological change.

The results of the study have further implications for managers as they should align their talent management practices with both long and short-term organisational goals. The study revealed that automotive organisations did not always place the required attention on attracting, developing and retaining talent. Therefore, the automotive industry should adopt a holistic and integrated talent strategy to meet Industry 4.0 demands. Bussin (2014) identifies an attractive EVP as the only solution to the inability of attracting, developing and retaining key talent. Aspects such as the continuous upskilling of existing employees, proper recognition, growth opportunities, a life-long learning organisational culture, and effective performance management should form the foundation of an EVP.

As such, the nurturing of talent to meet both current and future organisational needs is deemed imperative. The results obtained in this study emphasise the importance of a talent strategy being supported by key talent management practices that enhances the idea of retaining talented individuals within automotive organisations.

7. Conclusions, Limitations and Future Research

The main aim of this study was to explore hybrid skills in Industry 4.0 set and implications for talent management in the automotive sector in South Africa. The results of the study could support the automotive industry as the second largest employer in the country, aiming to successfully manage talent in Industry 4.0. However, the results of this study have implications for all South African organisations that are concerned with upskilling and reskilling existing employees as well as with attracting, developing and retaining talented employees. Organisations that are seriously focussed on succeeding in Industry 4.0 cannot ignore the importance of Industry 4.0 talent and, as such, should develop an Industry 4.0 talent pipeline. Finally, with the worldwide war for talent continuing in Industry 4.0, automotive organisations should incorporate skills management into talent management practices that consist of attracting, developing and retaining talent and, in turn, contribute to overall organisational competitiveness (Klimova, 2016).

A limitation of this study was that most of the respondents in this study were from the Eastern Cape Province in South Africa with less participation from other provinces. However, the automotive sector is the second largest employer in the region and the hub of the automotive sector in South Africa. Future research could involve South African automotive training centres and specialised automotive trainers to get insight into their experiences in preparing South African employees for technological changes in the automotive industry in South Africa. Employees on different levels in the organisation and in different units could be interviewed, to gain an understanding of how they perceived the level of their skills and their skill development needs.

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