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The impact of Training and Assessment Register (TAR) on productivity in the automotive parts manufacturing organisation in South Africa

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Orientation: Organisations are confronted with the challenge of competency among its employees for productivity improvement. They implement strategies that improve employee skills proficiencies for higher productivity. These can also be achieved by implementing a training model that develops employee's skills and knowledge so that they become the specialists in their work areas. This sentiment underpins the concept of employee Training and Assessment Register (TAR).

Purpose: This study evaluates the influence of TAR on productivity in automotive parts manufacturing organisation in South Africa.

Motivation for the study: The South African manufacturing sector has a low level of productivity compared to its counterpart industries in the Asian and Western countries. The sector experiences the lack in short to medium term growth in productivity.

Research design, approach and methods: The automotive parts manufacturing company that has used a TAR strategy for productivity improvement participated in the study. The study objectives were achieved by examining the production and related experiences in the company. The collection of data was carried out in two phases. This includes the collection of pre- and post-quarterly data for spoilage, overtime and customer complaints. The pre-TAR results were quarterly data reflecting the company's performance over the three-year period prior to the implementation of TAR. This company operates in the eThekwini District Municipality in KwaZulu-Natal.

Main findings: The results established that spoilage rate has a relationship with company productivity. Any decrease in spoilage rate would result to an increase in company productivity. However, the overtime and customer complaints do not statistically have a relationship with company productivity.

Contribution: This article uncovers the strengths and weaknesses of TAR on productivity in the automotive parts manufacturing organisation in South Africa.

Keywords: business performance; customer complaints; overtime; productivity; South Africa; spoilage; skills; training and assessment register.

Introduction

The business world today has been characterised by ongoing technological enhancement, which embodies globalised trading markets and increased competitiveness (Jones, Benyon, Pickernell, & Packham, 2013). The working practices have been increasingly sophisticated with the improvement on the requirements and the provisions for training (Saunders, Lewis, & Thornhill, 2000). There is a body of literature that generally supports the positive influence training has on business performance through improved quality, productivity, labour turnover and financial results (Aragon & Sanz-Valle, 2013; Noe, 2010). Training assists companies in creating sustainable competitive advantages. By definition, training is the systematic acquisition and development of knowledge, skill and attitudes required by employees to adequately perform a task or to improve the performance in the job environment (Chen, Hsu, & Huang, 2013). Studies indicate that training is positively related to both the human resource (HR) outcomes such as low absenteeism, low turnover, motivation and the organisational performance, such as the production output or quality (Allix, 2016; Aragón-Sánchez et al., 2003; García, 2005). However, this study focuses on the Training and Assessment Register (TAR). Training and Assessment Register is a company-specific training model that develops employee skills and knowledge. It enables employees to improve in technical

and problem-solving skills. They become specialists in their work areas. Most training programmes work well in that the majority of employees who undergo training learn more than those who do not react positively to the training experience, and after training, engage in the behaviours targeted by the programme (Robbins, Judge, Odendaal, & Roodt, 2009). Employees who have been trained by the TAR are provided with resources to apply what they have learnt, are given opportunity to apply their newly learnt technical and problem-solving skills and motivated to continuously learn.

Thus, the role of training has become so much more than 'training programme design' (Noe, 2010). While the importance of instructional design remains effective, there is an increasing call for trainers and training managers, as well as HR experts to create systems that motivate employees to learn, create knowledge and share that knowledge with other employees in the company (Jones et al., 2013). According to Noe (2010), the focus of training has traditionally been more of a 'one-time event', yet today the expectation is that training must create 'conditions for learning' made possible by means of collaboration, along with various methods, such as traditional classroom training, online learning or a blend of methods. A body of literature supports that training positively influences business performance (Aragon et al., 2013). This is visible through enhanced productivity, quality, labour turnover and financial results. Training assists companies to create sustainable competitive advantages (Jones et al., 2013). Companies that invest in employee training and engage in regular performance appraisal are more likely to benefit from lower employee turnover (Noe, 2010). Thus, training is a tool that improves the company's performance. While numerous studies recognise training as a phenomenon that improves the company's performance, evidence is not always provided through empirical research to support this effect. Aragon and Sanz-Valle (2013) explain that performance is not directly influenced by training, but rather, it is indirectly effective through the improvement of other organisational outcomes. However, this study evaluates the impact of TAR on productivity. It is guided by the following research questions (RQs):

- RQ1: Is TAR an appropriate training model for productivity improvement in the automotive parts manufacturing organisations in South Africa?
- RQ2: Is TAR a suitable training model for the reduction of spoilage and customer complaints for productivity improvement?

Problem statement: Lack to recognise the influence of training on productivity

The South African manufacturing industry's decline in productivity is a major concern. South Africa experiences low productivity in the manufacturing sector when compared to Korea, the United States, Taiwan, Japan, France and the United Kingdom (Klein, 2012). The country lacks both the short- and long-term growth in productivity (UNIDO, 2013). Unfortunately, the majority of private, governmental and the international organisations do not recognise the influence of training for productivity improvement (Imran, 2013). However, Aragon and Sanz-Valle (2013) indicate that there is a positive link between training and employee performance. Hence, this study assesses the impact of TAR on productivity.

Literature review

This section elaborates on an overview of employee training. It presents training and organisational learning. Training and company performance concludes the theoretical framework for this study.

Overview of employee training

The word 'skills' has gained momentum since the 2000s as opposed to the term 'education and training' which was espoused in the 1990s (Ngcwangu, 2014). It designates a specific form of task-oriented work and indicates a normative departure from all-encompassing educational processes integrated with training. However, training is the systematic acquisition and development of knowledge, skill and attitudes required by employees to adequately perform a task or to improve the performance in the job environment (Chen et al., 2013). According to Imran (2013), organisations should revamp the performance of their personnel for its growth and success. Hence, training becomes an important strategic tool that benefits both the employees and employers. The provision of a comprehensive training and development enabled the organisation to enhance and develop the quality of their employees. Other than its benefits in productivity improvement, it motivates and inspires employees by letting them know how important their jobs are and giving them the information they need to perform those jobs (Imran, 2013). The efficiency in processes, increase motivation, innovation, morale, job satisfaction and reduced turnover are the general benefits from employee training. Studies allude that training is positively related to both HR outcomes, such as low absenteeism, low turnover and motivation, and organisational performance, which includes production output or quality (Allix, 2016; García, 2005). Today, businesses are characterised by ongoing technological enhancement and increased competitiveness (Jones et al., 2013). This has resulted in working practices that are increasingly sophisticated, with training provision playing a huge role.

Training and organisational learning

The 'learning by doing' and 'learning by using' are consistent with the organisational learning literature's concept of single-loop learning in which collective learning is characterised by a single feedback loop that facilitates 'doing things better' (Jones et al., 2013). However, businesses apply the use of double-loop learning. In this case, the collective learning is characterised by 'doing things differently' or 'doing different things' (Jones et al., 2013). This requires the capability to break the path of dependency and change the technologically trajectory through radical innovations. According to an OECD (2013), a number of factors determine the mode of

training required. For manufacturing companies, the market and the need to remain competitive are the main drivers. However, the effectiveness of training depends on the method under which an individual acquires knowledge, skills, attitudes and opinions (Idowu, 2013). While learning starts from individuals (Ikehara, 1999) and the learning organisation is founded on the learning process of the individuals in the organisation (Idowu, 2013), the organisation cannot learn unless individuals learn (Argyris & Schon, 1996).

Organisational learning differs from individual learning (Senge, 1990). It consists of individuals who are involved in learning activities. The learning process results to innovation in the organisation (Idowu, 2013). Innovation is an important determinant for a company's performance (Bueno & Ordonez, 2004). It hinges on an individual's creative ability to recreate or invent products that are novel. Idowu (2012) describes it as a variable that creates value for the business. While organisational learning produces innovation, its effectiveness is driven by the knowledge available in the organisation. Ngcwangu (2014) discusses it as a necessary variable that stimulates the development of factors that enables the introduction of new ideas, products, services and systems.

Training and company performance

The investment in training has long been recognised as a critical factor that plays a role in the economic development of both the industrial and service sectors (Ballot, 2002). A large number of theoretical and empirical studies in the United States, Europe and the United Kingdom show that the most powerful predictor of productivity and profitability improvement relies in such an investment (Blandy, Dockery, Hawke, & Webster, 2000). This includes studies conducted in the South African context (Egelser & Rena, 2012; Mbonyane & Ladzani, 2011). Through training, companies reap substantial financial and non-financial returns from well-designed and delivered training programmes (Doucouliagos & Sgro, 2000). According to Kozlowski, Brown, Weissbein, Cannon-Bowers and Salas (2000), organisational improvement and development is enhanced by the knowledge and skills in the workforce that would have been obtained from training.

Training and employee performance

Purcell, Kinnie, Hutchinson, Rayton and Swart (2003) established a strong positive relationship between HR management practices and organisational performance. The vital HR management practice that positively influences the quality of the worker's skills, knowledge and capability is training and development. As a consequence, it results in higher employee performance on the job.

Harrison (2000) indicates that learning through training influences the organisational performance by greater employee performance. Hence, implementing a training programme as a solution to covering performance issues such as filling the gap between the standard and the actual performance is an effective way of improving employee performance (Swart, Mann, Brown, & Price, 2005). According to Wright and Geroy (2001), employee competencies change through effective training programmes. It not only improves the overall performance of the employees to effectively perform the current job but also enhances the knowledge, skills and attitude necessary for the future job, thus contributing to superior organisational performance. Through training, employee competencies are developed and enable them to implement their tasks efficiently. It helps the organisation achieve its objectives in a competitive manner. Nonetheless, employee performance is also affected by some environmental factors such as organisational structure, power and politics prevailing in the organisation, job design, corporate culture, group dynamics and the performance appraisal systems (Wright & Geroy, 2001). However, this study assesses the impact of TAR on productivity. It also examines if TAR is a suitable training model for reducing spoilage and customer complaints.

Hypothesis

This study is guided by the following hypotheses:

H1: The implementation of the TAR leads to productivity improvement in the automotive parts manufacturing organisation.

H1o: The implementation of the TAR does not lead to productivity improvement in the automotive parts manufacturing organisation.

The following are sub-hypotheses:

H2: An increase in the spoilage rate increases company productivity in the automotive parts manufacturing organisation.

H2o: An increase in the spoilage rate decreases company productivity in the automotive parts manufacturing organisation.

H3: An increase in the overtime rate increases company productivity in the automotive parts manufacturing organisation.

H3o: An increase in the overtime rate decreases company productivity in the automotive parts manufacturing organisation

H4: An increase in the rate of customer complaints increases company productivity in the automotive parts manufacturing organisation.

H4o: An increase in the rate of customer complaints decreases company productivity in the automotive parts manufacturing organisation.

Methodology

This section discusses the method employed in this research. These are discussed under the following headings, namely, research design, the organisation that participated in the study, data collection, and the measurement and data analysis.

Research design

This study, which examined the relationship of company productivity as a dependent variable to spoilage, overtime

and customer complaints, was quantitative in nature. Quantitative application involved the use of statistical procedures to analyse the data collected (Bryman & Bell, 2007). Hence, after the measurements of the relevant variables, the scores were transformed using statistical methods. This research was also conclusive in design. According to Yin (2008), conclusive studies are meant to provide the information that is useful in decision-making.

The organisation that participated in the study

A convenience sample from one large automotive parts manufacturing organisation situated within the eThekwini Metropolitan Area in the province of KwaZulu-Natal in South Africa was used. In 2005, the company embarked on lean manufacturing principles with the aim to improve product quality, productivity and customer satisfaction. However, it continued to experience an increase in customer complaints and low productivity. For instance, in the period between 2002 and 2005, customer complaints increased from 17% to 33%. Similarly, company productivity decreased from 81.7% to 69.2%. The company then conducted the root-cause analyses aimed at identifying the problem. It established that the blue-collar employees were semi-skilled and relied on shop floor supervision. Consequently, it implemented TAR in all its processes. The strategy was aimed at improving employee knowledge and skills to improve its productivity and reduce customer complaints. The company had 1003 employees. It operates a three-shift system. Table 1 presents a percentage breakdown of employees in terms of their level of activities.

Data collection

The collection of statistical data was carried out from a single company that participated in the study. It was performed into two phases. That is, the collection of pre- and post-TAR results by a quality control team leader from the company's operational records. The data for spoilage rate, overtime rate and the rate on customer complaints were kept on the System, Applications and Products (SAP) version 6.0 data management programme. The pre-TAR results were quarterly data reflecting the company's performance over the 3-year period prior to TAR implementation. This includes data from the first quarter of 2006 to the final quarter of 2008. The post-TAR data reflect the company's performance for 8 years after TAR was implemented. This includes data from the first quarter of 2010 to the final quarter of 2017. The company implemented TAR in 2009 and such data were excluded from the study.

TABLE 1: Percentage breakdown of employees in terms of their level of activities.

Number	Level of activity	Percentage
1.	Plant management	3.9
2.	Support administration staff	6.2
3.	Team leaders	8.1
4.	Line functional employees	81.8

Measurement and data analysis

The company's quarterly time series data for spoilage, overtime and customer complaints were used. A total of 135 observations were measured. However, the study introduced a dummy variable that assumed the value of 0 and 1 to represent the pre- and post-TAR, respectively, into the ordinary least squares (OLS) model. This was aimed at isolating the pre- and post-productivity effects. For instance, if TAR proved to be a useful strategy in raising productivity levels, this would result in a statistically significant coefficient on the dummy variable.

The OLS model used was as follows: $Company\ Productivity = B_o + B_1\ Spoilage\ rate + B_2\ Overtime\ rate + B_3\ Rate\ on\ customer\ complaints + B_4\ Post\text{-}dummy\text{-}TAR$.

The above model identifies company productivity as a function of spoilage, overtime, customer complaints and the TAR strategy.

For the study to achieve its objectives, the normality test was conducted using Kolmogorov–Smirnov and Shapiro–Wilk for the overall score of the constructs. Table 2 presents results of normality tests for spoilage rate, overtime rate and the rate on customer complains.

Statistical tests in Table 2 showed that the data were not normally distributed ($p > 0.05$). Hence, the study was analysed using parametric test, that is, the *t*-tests.

Ethical consideration

The researcher complied to the following: the process for the collection of data did not involve access to confidential personal data; the research fulfil the criteria for informed consent; respondents were not asked to perform any acts or make statements which might be expected to cause discomfort; researcher did not expect to obtain any direct or indirect financial or other benefits from conducting the research.

Study results

This section analyses the results for pre- and post-TAR means comparison, as well as company productivity.

TABLE 2: Normality tests for spoilage and overtime rates, as well as the rate on customer complains.

Kolmogorov–Smirnov†	Group	Statistic	df	Sig.	Shapiro–Wilk		
					Statistic	df	Sig.
Spoilage rate	0	0.165	12	0.200*	0.931	12	0.388
	1	0.142	33	0.088	0.883	33	0.002
Overtime rate	0	0.158	12	0.200*	0.935	12	0.436
	1	0.182	33	0.007	0.901	33	0.006
Rate on customer complains	0	0.276	12	0.012	0.669	12	0.000
	1	0.377	33	0.000	0.692	33	0.000

*, This is a lower bound of the true significance.
†, Lilliefors significance correction.

TABLE 3: Pre- and post-training and assessment register percentage means comparison.

Number	Variable	Pre-TAR period (%)	Post-TAR period (%)	% Mean difference (pre – post)
1.	Spoilage rate	48.08	19.58	+28.50
2.	Overtime rate	22.08	15.18	+6.90
3.	Rate on customer complaints	8.17	9.06	-0.89

TAR, Training and Assessment Register.

TABLE 4: Company productivity results on spoilage rate, overtime rate, the rate on customer complaints, and post-training and assessment register dummy.

Regression	Coefficient	*t*-Statistic	Probability
Constant (B_o)	0.960	2.281	0.028
Spoilage rate	-0.605	-4.622	0.000
Overtime	-0.043	-0.299	0.766
Customer complaints	-0.001	-0.012	0.991
Post-TAR dummy	0.077	0.514	0.610
R^2	0.429	F-statistics	7.505
Adjusted R^2	0.372	Sum of squares	3.773
Standard error of the estimate	0.355	Durbin–Watson stat.	0.458

Note: Regression data: 2006–2017 for 135 observations. The following OLS estimation is based on the equation: company productivity = B_o + B_1 spoilage rate + B_2 overtime rate + B_3 rate on customer complaints + B_4 Pre/Post-Dummy.
TAR, Training and Assessment Register.

Pre- and post-training and assessment register means comparison

Table 3 compares the means (in percentages) for spoilage rate, overtime rate and the rate on customer complaints.

Results in Table 3 indicate that the percentage mean data for pre-TAR on spoilage, overtime and customer complaints are 48.08%, 22.08% and 8.17%, respectively. In addition, the percentage mean data for post-TAR on spoilage, overtime and customer complaints are 19.58%, 15.18% and 9.06%, respectively.

Company productivity results

Table 4 presents the results for company productivity as a dependent variable to spoilage rate, overtime rate, the rate on customer complaints and post-TAR dummy.

Company productivity as a dependent variable to spoilage rate

Results as presented in Table 4 indicate that the spoilage rate has a relationship and is statistically significant to company productivity. This is shown by its *t*-value of -4.622, which is above the critical *t*-value of 2.015 at the 5% level of significance (Curwin & Slater, 2002). The negative relationship indicates that any decrease in spoilage rate would result to an increase in company productivity.

Company productivity as a dependent variable to overtime rate

Results as illustrated in Table 4 show that the overtime rate has no relationship to company productivity. This is determined by its *t*-value of -0.299. The value is below the critical *t*-value of 2.015 at the 5% level of significance, thus accepting the null hypothesis of no relationships between these two variables.

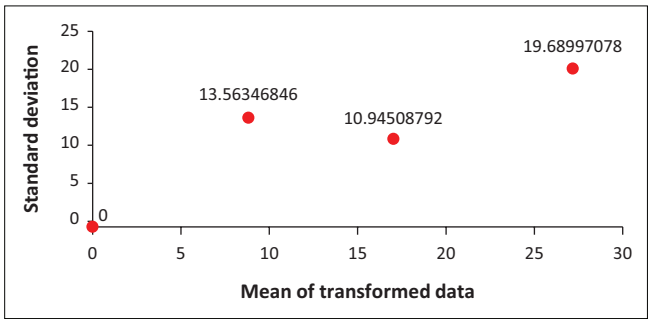

FIGURE 1: Bartlett's test for homogeneity of variances.

TABLE 5: Bartlett's test for homogeneity of variance.

Variables	Means of transformed data	Standard deviations of transformed data	*p*
Spoilage rate	27.178	19.69	0.000
Overtime rate	17.022	10.945	
Rate of customer complain	8.822	13.563	

TABLE 6: Levene's test of equality.

F	*T*	Sig.
6.315	-2.264	0.016

Note: Fisher–Snedecor (F); *t*-statistics for equality of means (T); significant (sig.).

Company productivity as a dependent variable to the rate of customer complaints

Table 4 indicates that the rate on customer complaints has no relationship to company productivity. This is determined by its *t*-value of -0.012. The value is below the critical *t*-value of 2.015 at the 5% level of significance, thus accepting the null hypothesis of no relationships between these two variables.

Company productivity as a dependent variable to a Training and Assessment Register dummy variable

Results show that TAR has no relationship to company productivity. This is determined by its *t*-value of 0.514. The value is below the critical *t*-value of 2.015 at the 5% level of significance, thus accepting the null hypothesis of no relationships between these two variables. It has the adjusted R^2 of 0.372. In addition, the serial correlation is also low at 0.458 when compared to the alpha value of 1.72 at the 5% level of significance (Curwin & Slater, 2002).

Summary of results: Statistical tests and box plots

This section uses factorial designs to analyse data. Box plots have also been incorporated in the analyses. They determine whether the factorial Analysis of variance (ANOVA) assumptions of normality and homogeneity of variance have been met. According to Porkess (2005), the populations

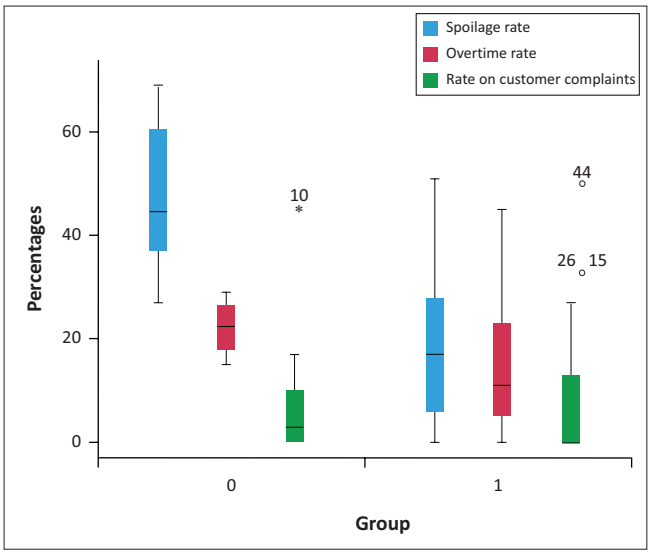

FIGURE 2: Box plots assessing the homogeneity and normality of variance.

represented should be normally distributed (i.e. the normality), making the mean an appropriate measure of central tendency. However, the homogeneity of variance indicates that the population from which the data are sampled should have the same variance.

The Bartlett's test was used to verify whether the variances were equal for all the samples (Curwin & Slater, 2002). Figure 1 presents a summary of the results from the Bartlett's test for homogeneity of variances.

In addition, Table 5 presents detailed results of Bartlett's test for homogeneity of variances for spoilage and overtime rates, as well as the rate of customer complains.

The *p*-value in the Bartlett's test (at $p < 0.05$) shows that the homogeneity of variances has occurred, thus rejecting the null hypothesis. The *p*-value at 0.000 is low as compared with the significant level of 0.05. We can conclude that there are distribution changes between the two parts of time series. This is confirmed by Levene's test of equality, as shown in Table 6.

The Levene's test of equality is defined as the inferential statistics used to examine the equality of variance on different samples (Porkess, 2005). In this case, the statistical procedure assumes that variances of the populations from which different samples are drawn are equal. Consequently, the results in Table 6 indicate that the obtained similarities between the variances in the samples for pre- and post-data at *p*-value 0.016 have occurred. They are below the statistical significant level of 0.05. The results are confirmed by box plots in Figure 2.

Figure 2 shows that the mode of change from pre- to post-TAR period is homogeneous. Box plots developed from TAR data shown indicate a similar spread. Statistical tests indicate that the conditions for homogeneity of variances between the pre- and post-TAR have been met.

Discussions

This study investigates the impact of TAR for company's productivity improvement in the automotive parts manufacturing organisation in South Africa. It examined the production and related experience of the automotive parts manufacturing organisation that has adopted TAR to improve employee skills within its employees. Quarterly time series data on spoilage, overtime and customer complaints were used to analyse data. The results indicate that spoilage rate has a relationship and is statistically significant to company productivity. This is supported by Aragon and Sanz-Valle (2013) who indicate that training positively influences on business performance, visible through improvement in quality, productivity, labour turnover and financial results (Aragon & Sanz-Valle, 2013). However, the rate on overtime and customer complaints as well as TAR do not statistically have a relationship with company productivity.

Implications of results for policy and practice

Organisations in South Africa should revise employee skills and develop strategies, policies and practices that help to achieve new business goals and support performance (Aragon & Sanz-Valle, 2013). This will be based on an appreciation of the economic determinants affecting shop floor skills development for company productivity. Besides the achievement of study objectives, the following conclusions can be made on the TAR philosophy:

1. It is a training model that improves quality and business performance.
2. It reduces spoilage level in the business, thus improving company productivity.
3. To maximise performance, a comprehensive performance policy must be developed, which aligns TAR to productivity (Aragon & Sanz-Valle, 2013).

Limitations of the study

The study was confined to an automotive parts manufacturing organisation operating within the eThekwini Metropolitan Area. It was carried out to a single company that has implemented TAR employee skills programme. As there are 378 registered automotive parts manufacturing organisations in South Africa (SAinfo, 2008), the results cannot be extrapolated to other companies within the sector. Secondly, it did not examine the process followed during the TAR including (among others) the individuals who participated in the implementation process. It only used quarterly time series data to determine the pre- and post-company productivity effects resulting from TAR employee skill development strategy. Lastly, the econometrics paradigm used was of the OLS variety, solely because of data constraints. Future studies should employ an advanced VAR Johansen approach or longitudinal data analysis, both of which rely on multi-dimension data sets.

Conclusion

Training and Assessment Register is a training model that develops employee's skills and knowledge so that they become specialists in their work areas. Properly implemented and managed, the model results to employee performance and company productivity improvement. Hence, the study indicates that spoilage rate has a relationship with company productivity after the TAR was implemented. However, the rate on overtime and customer complaints does not statistically have a relationship with company productivity in the selected automotive parts manufacturing organisation. The system is not a solution to inherent productivity problems. It is a training approach that takes advantage of a focused organisational strategy to combine employee communication, decision-making and participation (Ngcwangu, 2014). It develops employee skills and knowledge in the organisation.

Future research required

During the course of the study, broader issues of TAR were excluded from the study. This includes the long-term survival of TAR model after implementation. In addition, the applicability of TAR to a wider sector of the economic activity, including the public sector, was not covered. The approach under which this study was carried out did not allow these areas to be analysed in depth. It is recommended that future research should examine the following issues in greater depth:

- circumstances that influence the use of TAR
- the application of TAR approach to the service industry
- the process followed during the implementation of TAR system
- an in-depth assessment of the registered automotive manufacturing businesses that uses the TAR approach, employing a randomised sample design so that the results can be generalised.

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Competing interests

The author declares that he has no financial or personal relationships that may have inappropriately influenced him in writing this article.

Author(s) contributions

The author, R.W.D.Z., administered the questionnaire, worked on the literature review, analysed the raw data, aligned and consolidated the article into a final manuscript.

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

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