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Employee productivity spillovers generated by incentive schemes

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Orientation: The introduction of various incentive schemes in the South African workplace creates incentive-induced employee productivity spillovers but could differ between industries and geographic areas.

Research purpose: The aim of the study was to determine the industry and geographic nature of incentive-induced employee productivity spillovers to inform managerial decision-making on intrinsic and extrinsic motivators.

Motivation for the study: The introduction of incentive schemes is an important motivator of employee productivity in the workplace. For this study, it was deemed important to indicate whether incentive-induced employee productivity spillovers differ between industries and geographic areas by taking into consideration firm-size, firm-profitability, different incentive schemes, trade union presence, employee age and skill levels.

Research approach/design and method: Fixed-effect panel data estimations were computed to predict incentive-induced employee productivity spillover effects based on secondary firm-based data sets.

Main findings: Incentive scheme-induced employee productivity spillover effects were generally similar for all the different industry and geographic areas. The spillovers increased with greater firm-sizes, higher profitability levels, introduction of greater levels of monetary-based incentive schemes (especially for unionised employee segments), and allocation of incentive schemes to the middle- age employee grouping (35 years–55 years) as well as higher skilled employees.

Practical/managerial implications: The effective introduction of incentive schemes in the workplace is an important mechanism for creating positive employee productivity spillover effects and it is generally common for all firms irrespective of the industry or geographic area.

Contribution/value-add: Improved understanding of incentive-induced employee productivity spillovers in the South African workplace will enable the effective alignment of incentive schemes with firm profitability.

Keywords: incentive schemes; fixed-effect panel data estimations; incentive-induced employee productivity spillover impacts; monetary-based incentive schemes; non-monetary incentive schemes; trade unions.

Introduction

The aim of the article was to determine the industry and geographic nature of incentive-induced employee productivity spillovers when variables such as firm-size, firm-profitability, different incentive schemes, trade union presence, employee age and skill levels are considered.

Determining employee participation in the financial wellbeing of organisations through monetary or non-monetary incentives is important for examining how extrinsic and intrinsic motivation lead to productivity. Studies investigating monetary or non-monetary incentive schemes have been instrumental in our understanding of employee productivity and organisational performance (Adewuyi & Effiong, 2017; Adom et al., 2020; Aguinis et al., 2013; Antonietti et al., 2017; Damiani & Ricci, 2013; Damiani et al., 2013, 2016; Daniel, 2019; Gielen et al., 2010; Jones & Kato, 2012; Jones et al., 2008, 2010, 2012, 2017; Kalmi & Sweins, 2010; Kato & Kauhanen, 2018; Kato et al., 2010; Lucifora & Origo, 2015; Mullins, 2022; Ortlieb et al., 2016; Park et al., 2022; Sesil & Lin, 2011; Sgarbossa et al., 2022; Singh & Chaudhary, 2022; Ude & Coker, 2012; Yang & Chen, 2019; Yoon &

Sengupta, 2021). However, there is a lack of empirical knowledge in South Africa with findings on incentive-induced employee productivity focusing on the monetary and non-monetary components using panel data analysis. This theoretical void presents a new avenue of research specifically focused on firm-size, firm-profitability, different incentive schemes, trade union presence, employee age and skill levels.

Employee financial participation in the organisations' profitability serves as a motivational factor that stimulates and ignites positive behaviour towards achieving the business targets (Farndale et al., 2019). The self-determination theory (SDT) of motivation asserts that people are stimulated to achieve greater levels of workplace contribution and productivity if they receive monetary or non-monetary incentives (Landry & Whillans, 2019; Landry et al., 2022). There has been a shift from the traditional fixed-pay contract to variable-pay with monetary incentives such as a bonus, stock options and team-based rewards serving as extrinsic motivators (Kato et al., 2010). Non-monetary incentives such as growth opportunities, flexible work arrangements, autonomy and job enrichment instil intrinsic motivation, leading to higher levels of job satisfaction (Adom et al., 2020; Aguinis et al., 2013). Monetary and non-monetary incentives foster employee participation in the financial wellbeing of the organisation and subsequently motivate them to improve their level of productivity. However, the allocation of incentives is not mandatory, but depends on business profitability and the managers' priority of serving the interests of shareholders (Akinyele et al., 2021; Bennett & Levinthal, 2017; Pendleton, 2006). Although employee productivity leads to increased profitability, the transfer of benefits to workers in the form of incentives vests in managerial decision-making and the company's capacity to afford these incentives (Farndale et al., 2019). Managerial discretion is embedded on the agency theory, which indicates that business leaders tend to pursue their financial interests through maximising employee productivity in a manner that contradicts the shareholders' interests (Mendoza et al., 2021). Simultaneously, employees have a discretionary capacity to withhold or improve their productivity, which ultimately increases agency costs (Pendleton, 2006). This conflict of interest in trading-off profitability, incentive schemes and managerial stock options affects employee productivity. Therefore, such agency problems can be overcome by implementing performance-based pay (PBP) systems that balance the interests of shareholders, managers, and employees (Arbaugh et al., 2004; Bae, 2021; Evans & Tourish, 2017; Feng et al., 2022; Jackson & Morgan, 2011; Kim & Bak, 2020; McConville et al., 2020; Němečková, 2017; Sloof & Van Praag, 2008).

Human resource practices (HRPs) such as PBP systems take the form of stock options or profit-sharing schemes to increase employee productivity, yielding future returns for key stakeholders (Antonietti et al., 2017; Jones et al., 2008). Hence, effectively embedded PBP systems focused on incentive-induced employee productivity will capture the desired individual and shareholder returns over longer time periods (Feng et al., 2022). Despite the significance of this relationship, the paucity of research on this topic in South Africa propelled the current study in this direction. A systematic literature review of conceptual and empirical studies focused on the period 1992–2019 confirmed that there were fewer publications in South Africa compared to other countries internationally (Singh & Chaudhary, 2022), which underlines the need for this study.

Research purpose and objectives

This study set out to examine the nexus between incentive schemes and employee productivity spillovers with a focus on firm-size, firm-profitability, different incentive schemes, trade union presence, employee age and skill levels in the South African workplace.

Literature review

Theoretical context

There have been several attempts to explore the relationship between incentive schemes and employee productivity, but few studies could be found in the South African context, despite heightened interest in understanding how employee participation in the financial wellbeing of an organisation improves its overall performance. Employee productivity is a human resource (HR) measurement aspect grounded on human capital and economic theories. It can be measured in terms of the number of sales or sales per employee and value-added per employee, which accounts for the net output minus inputs in the production process (Singh & Chaudhary, 2022). A literature survey undertaken from a human capital theory perspective generally concluded that employees' level of productivity increases when they are incentivised through monetary and non-monetary rewards (Aguinis et al., 2013; Antonietti et al., 2017; Jones et al., 2008; Landry & Whillans, 2019; Landry et al., 2022). Specifically, and according to the SDT, employees are more inclined to increase their effort and exert themselves proficiently if incentives are at stake (Landry & Whillans, 2019; Landry et al., 2022). Moreover, it is expected that companies that offer monetary and non-monetary incentives will most likely motivate employees, improve job satisfaction, and ultimately increase productivity (Adom et al., 2020; Aguinis et al., 2013; Jeffrey et al., 2013; Sorauren, 2000).

However, incentive-induced employee productivity depends on the organisation's profitability and the discretion of managers assigned with crafting the strategic direction of the organisation. Incentive schemes are designed for improving business profitability based on set performance targets (Antonietti et al., 2017; Drake et al., 1999; Hinderlich, 2014; Jones et al., 2008; Ortlieb et al., 2016). Agency theory suggests that managers or business leaders tend to maximise their utility rather than reward employee productivity and shareholders (Farndale et al., 2019; Mendoza et al., 2021). In return, employees may withhold

their productivity, which ultimately affects organisational performance and shareholder value (Pendleton, 2006). This agency problem can be mitigated by aligning managers' and employees' performance targets with rewards (Bae, 2021; Evans & Tourish, 2017; Feng et al., 2022; Jackson & Morgan, 2011; Kim & Bak, 2020; McConville et al., 2020; Němečková, 2017; Sloof & Van Praag, 2008). Incentive-induced employee productivity is an integrated system linking business, managers, and employees' performance targets.

Moreover, it is important to minimise the cost of opportunistic behaviour from managers and focus on the monetary (extrinsic) and non-monetary (intrinsic) aspects of employee motivation to increase their productivity. Aguinis et al. (2013) confirmed that employee productivity can be enhanced through both monetary and non-monetary rewards when performance is accurately measured, rewards are contingent on performance, are made timeously, and justice is maintained in rewarding performance.

Profitability and employee incentives

Economic and human capital theories provide a framework for critically examining the connection between profit, incentives and employee productivity. It is well established that companies that share profits by incentivising employees will most likely induce employee motivation, effort, cooperation and productivity. Profitability is a key measure of organisational success used to determine financial gains from the resources deployed in the production process, which ultimately guides decision-making in profit sharing (Arbaugh et al., 2004; Chu et al., 2011; Jana & Petr, 2013; Kalmi & Sweins, 2010; Oberman et al., 2022; Strifler, 2018). Profit-sharing is a structured employee stock ownership plan (ESOP) used to incentivise workers for contributing to the success of the organisation, while at the same time improving personal earnings and maximising employees' utility (Farndale et al., 2019). Hence, it is expected that the allocation and increase in employee incentives will correlate with profit generated by firms over time.

Kato et al. (2010) confirmed that the use of profit sharing in the form of stock ownership plans for non-executive employees is a growing practice in most organisations, aligning individual and organisational performance. According to the findings of Strifler (2018) on wage-profit elasticity, employees would expect a fair share of increased profits and may use collective bargaining as the means to achieve this goal. Trade unions continue to intensify their efforts through collective bargaining to improve employee participation in profit-sharing, placing organisations under pressure to redesign incentive schemes (Antonietti et al., 2017; Jones et al., 2012a). Agency and motivation theories were applied in a study examining profit-sharing based on business growth, and it was found that a larger percentage of both equity ownership and employee incentives can be derived from increased sales (Arbaugh et al., 2004; Mullins, 2022). Conversely, incentive plans may not generate the expected sales and gross margins unless the financial and non-financial aspects of performance measurement are incorporated (Chu et al., 2011).

Moreover, incentive schemes with monetary and non-monetary rewards induce the expected employee motivation and effort (Adom et al., 2020; Aguinis et al., 2012; Landry & Whillans, 2019; Landry et al., 2022). Therefore, when designing incentive schemes, HR departments should be mindful of unethical behaviour, internal competition among employees, self-interested behaviour, secrecy and perceived injustices in profit sharing (Oberman et al., 2022). They should also consider the influence of trade unions on collective bargaining in such profit-sharing decision-making (Jones et al., 2012a; Strifler, 2018) and align HR practices with talent optimisation goals (Ortlieb et al., 2016).

Incentive-induced employee productivity

Numerous studies have confirmed the relationship between incentive schemes and employee productivity improvement with Human resource management (HRM) implications. A study that applied the Cobb-Douglas production function in estimating incentive-induced employee productivity found HRM practices such as PBP and financial participation to stimulate individual motivation led to enhanced business performance (Jones et al., 2008). The introduction of teams, company-wide profit-sharing and a group system of PBP yielded increased productivity efficiency of between 9 and 20% points, highlighting the impact of employee incentives (Jones et al., 2010). By applying fixed-effect panel data modelling, Gielen et al. (2010) found that the introduction of PBP increased the productivity of firms by about 9%, but that it was important to guard against incentive free riders, especially where team-based incentives are used. Free riders benefit from profit sharing at the expense of team members who outperform their peers (Gielen et al., 2010; Jones et al., 2010; Oberman, et al., 2022). In another study using a fixed-effect panel data model, Kato and Kauhanen (2018) computed improved productivity based on group incentives rather than individual PBP. In terms of intrinsic motivation, Yang and Chen (2019) found that recognition and career development improve the labour productivity of employees under age of 45 years, confirming the importance of non-monetary incentives.

In the African context, two recent studies confirm the significance of incentive-induced employee productivity. Firstly, Adewuyi and Effiong (2017) investigated how incentive schemes correlate with employee productivity in Nigeria's construction industry and found 3.31% and 25% productivity improvements associated with incentive schemes.

Secondly, Daniel (2019) established 49.9% overall correlation coefficients between employee productivity and organisational performance after the introduction of monetary and non-monetary incentives. Despite clear evidence on incentive-induced employee productivity, Park et al. (2022) warned that incentive schemes can be counterproductive to employee

productivity and pose threats to health and safety as well as lessen workplace cooperation. To avoid this, companies should consider involving trade unions in the adoption of incentive schemes to ensure transparency and sufficient employee onboarding. Jones et al. (2012b, 2017) found that employee involvement or direct participation through trade unions fostered financial participation and provided meaningful incentives to motivate employees in achieving performance targets. In another study, Antonietti et al. (2017) confirmed that trade unions' presence in the workplace influences shared decision-making in the adoption of flexible-pay systems or incentive schemes aimed at improving employee productivity.

Interestingly, though, progressive declines in trade union membership affect employees' bargaining power in pursuing PBP systems, which may lead to low levels of productivity due to a lack of participation (Damiani et al. 2016; Lucifora & Origo, 2015). Accordingly, it can be concluded that employees may affiliate with trade unions to increase their chances of participating in the company's incentive schemes. It is recommended that HR practices facilitate trade union involvement and support collective bargaining in productivity-based incentive schemes (Damiani et al. 2016; Jones et al., 2008, 2010; Lucifora & Origo, 2015). Yoon and Sengupta (2021) emphasise the link between business strategy, HRM practices and the implementation of incentive schemes aimed at improving employee productivity. This is even more critical in the current world of work, which requires agile approaches to improving employee productivity, including hybrid-pay incentives for individual and team-work settings (Dlamini et al., 2015).

While most of this research confirms the relationship between incentive schemes and employee productivity, little is known about this phenomenon in South African workplaces – hence the present study, which critically examines this cause-and-effect relationship taking into consideration motivation and agency theories.

Research design

Research approach

An adapted version of the Jones et al. (2008) estimation methodology (which applied a Cobb-Douglas function converted into a log-linear format) to estimate the incentive scheme–employee productivity relationship was adopted in this study. This adaption was necessitated by: (1) the application of firm-based datasets, (2) the inclusion of various industries and geographic area dynamics and (3) employee age and skill attributes when the employee productivity effects of the introduction of incentive schemes were estimated. The unique contribution of the study was the econometric estimation of linking industry and geographic dynamics to the incentive scheme–employee productivity debate in the South African workplace. Two kinds of incentive schemes were included in the study, namely monetary and non-monetary incentives. Monetary-based incentive schemes referred to payments such as performance bonuses, profit-sharing, stock options or any cash amount paid to employees. Non-monetary incentive schemes included arrangements such as job rotation, flexible job design or any kind of non-monetary incentive scheme.

The study was aimed at testing five important hypotheses. These were:

H1: Greater firm-sizes and profitability levels have a strong impact on employee productivity levels generated by the implementation of incentive schemes (for all industries and geographic areas).

$H1_0$: Greater firm-sizes and profitability levels do not have a strong impact on employee productivity levels generated by the implementation of incentive schemes (for all industries and geographic areas).

H2: There is a differential impact on employee productivity spillovers between monetary-based and non-monetary incentive schemes when there are greater levels of unionisation in the workplace (for all industries and geographic areas).

$H2_0$: There is no differential impact on employee productivity spillovers between monetary-based and non-monetary incentive schemes when there are greater levels of unionisation in the workplace (for all industries and geographic areas).

H3: Greater levels of employee participation in the different incentive schemes created higher levels of employee productivity spillovers for monetary-based incentive schemes compared to non-monetary incentive schemes (for all industries in the geographic areas).

$H3_0$: Greater levels of employee participation in the different incentive schemes created the same levels of employee productivity spillovers for both the monetary-based and non-monetary incentive schemes (for all industries in the geographic areas).

H4: The employee productivity spillovers of both monetary-based and non-monetary incentive schemes differ between different age groups (for all industries and geographic areas).

$H4_0$: The employee productivity spillovers of both monetary-based and non-monetary incentive schemes do not differ between different age groups (for all industries and geographic areas).

H5: The employee productivity spillovers of both monetary-based and non-monetary incentive schemes differ between different skill levels (for all industries and geographic areas).

$H5_0$: The employee productivity spillovers of both monetary-based and non-monetary incentive schemes do not differ between different skill levels (for all industries and geographic areas).

Research sample

The quarterly sample period is 2013Q1–2019Q4 and sample data for this period were supplied from three industries as presented in Table 1.

The sample firms were mainly situated in the bigger urban areas of the various provinces and all the secondary firm-based data sets covered a variety of sub-sectors in all three industries and were deemed statistically significant. The data

TABLE 1: Geographic and industry sample.

Geographic areas	Manufacturing industry	Construction industry	Services sector
Gauteng	39	35	54
Western Cape	32	32	51
Eastern Cape	26	24	42
Northern Cape	17	18	34

sets were indexed to conform to the confidentiality requirements requested by the individual firms in the sample data sets. The manufacturing, construction and service industries were included as proxies for industry differences (based on their important impact on the regional economies and the availability of data) in the employee productivity–incentive scheme relationship. The geographic areas of Gauteng province, Western Cape province, Eastern Cape province and Northern Cape province were included in the study to capture the impact of Gross Geographic Product (GGP) differentials on the employee productivity–incentive scheme relationship. Gauteng province represented the higher GGP geographic area, Western Cape province represented the middle-to-higher GGP geographic area, Eastern Cape province the lower-to-middle GGP geographic area and Northern Cape represented the lower GGP geographic area.

Measuring instrument

A fixed-effect panel data methodology that focused on firm-base data sets was applied in the study to determine the industry and geographic dynamics of the impact of different incentive schemes on employee productivity. Gielen et al. (2010) indicated that fixed-effect panel data analysis is more useful in determining the causal effect of incentive schemes on employee productivity. Fixed-effect panel data estimations across different industries in different geographic areas were computed based on the measurement instrument presented in Table 2.

The study included employee age and skill levels as proxies for employee diversity attributes when the employee productivity–incentive scheme relationship was investigated. Training included any in-house and external formal training. Subsequently, firm-based data sets were extracted based on the following international standard classification of occupations (ISCO-08):

- Construction industry Job codes 71: Building and related trades workers, building frame and related trades workers, building finishers and related trade workers, painters, building structure clearers and related trades workers.
- Manufacturing industry Job codes 72 and 73: Metal, machinery and related trades workers, sheet and structural metal workers, moulders, welders and related workers, blacksmiths, toolmakers and related trades workers, machinery mechanics and repairers, handicraft and printing workers, printing trades workers.
- Service industry Job codes 14, 51 and 52: Hotel and restaurant managers, retail and wholesale trade

TABLE 2: Employee productivity measurement instrument.

Category	Employee productivity measures
Employee demographics	• Number of employees per major job code • Percentage change of the average number of employees per major job code • Average number of employees younger than 35 years • Percentage change in the average number of employees younger than 35 years • Average number of employees between 35 and 55 years • Percentage change in the average number of employees between 35 and 55 • Average number of employees older than 55 years • Percentage change in the average number of employees older than 55 years • Percentage change in the number of unionised employees
Remuneration and incentive valuation	• Average real employee remuneration per major job codes • Percentage increase in the value of incentive schemes • Average index scores for employee participation in the different incentive schemes
Monetary incentives	• Average number of employees partaking in monetary-based incentive schemes • Percentage change in the average number of employees partaking in monetary-based incentive schemes • Average number of employees with a less than 10 years training level partaking in monetary-based incentive schemes • Percentage change in the average number of employees with a less than 10 years training level partaking in monetary-based incentive schemes • Average number of employees with a training level between 10 years and 15 years partaking in monetary-based incentive schemes • Percentage change in the average number of employees with a training level between 10 and 15 years partaking in monetary-based incentive schemes • Average number of employees with a training level of more than 15 years partaking in monetary-based incentive schemes • Percentage change in the average number of employees with a training level of more than 15 years partaking in monetary-based incentive schemes
Non-monetary incentives	• Average number of employees partaking in non-monetary incentive schemes • Percentage change in the average number of employees partaking in non-monetary incentive schemes • Average number of employees with a training level less than 10 years partaking in non-monetary incentive schemes • Percentage change in the average number of employees with a training level less than 10 years partaking in non-monetary incentive schemes • Average number of employees with a training level between 10 years and 15 years partaking in non-monetary incentive schemes • Percentage change in the average number of employees with a training level between 10 years and 15 years partaking in non-monetary incentive schemes • Average number of employees with a training level of more than 15 years partaking in non-monetary incentive schemes • Percentage change in the average number of employees with a training level of more than 15 years partaking in non-monetary incentive schemes
Profitability	• Average real sales • Percentage change of the average real sales–employee remuneration ratios • Ratio of the percentage change in the average profit and the percentage change in the average non-monetary-based payments • Average real capital stock • Ratio of the percentage change in average real capital stock

managers, other services managers, personal services workers such as travel attendants, conductors and guides, cooks, waiters and bartenders, hairdressers, beauticians and related workers, building and housekeeping supervisors, other personal services workers, street and market salespersons, shop salespersons, cashiers, other sales workers.

Therefore, the focus of the fixed-effect panel data estimates was on the industry and geographic dynamics of incentive schemes-induced percentage changes in employee productivity spillovers due to percentage changes in the size of firms, the percentage change in the number of employees partaking in incentive schemes, the percentage change in the number and value of different incentive schemes, the percentage change in the age groupings partaking in the different incentive schemes, the percentage change in the skill level categories partaking in the different incentive schemes, the percentage change in unionised employees partaking in the different incentive schemes, and the percentage change in profitability of firms. Higher positive estimates indicated stronger employee productivity spillover effects.

For the fixed-effect panel data estimations, a log-linear format was applied in the study.

$$\boldsymbol{Ln\%\Delta RS}_{i,t,t-1}/\%\Delta ER_{i,t,t-1} = \boldsymbol{\alpha Ln\%\Delta K}_{i,t,t-1} + \boldsymbol{\beta Ln\%\Delta L}_{i,t,t-1} + \boldsymbol{\gamma Ln\%\Delta IS}_{i,t,t-1} + \boldsymbol{\lambda Ln\%\Delta E}_{i,t,t-1} + \boldsymbol{\mu Ln\%\Delta PR}_{i,t,t-1} \quad \text{[Eqn 1]}$$

$\boldsymbol{Ln\%\Delta RS}_{i,t,t-1}/\%\Delta \boldsymbol{ER}_{i,t,t-1}$ is the ratio of the percentage change in real sales and the percentage change in employee remuneration for firm-based data sets per industry and geographic area for period t – (t-1), and this ratio served as the proxy for employee productivity; $\boldsymbol{\alpha Ln\%\Delta K}_{i,t,t-1}$ is the percentage change in the ratio of the value of capital stock and the value of incentive schemes for the firm-based data sets per industry and geographic area for period t – (t-1) and it serves as the proxy for firm-size; $\boldsymbol{\beta Ln\%\Delta L}_{i,t,t-1}$ is the percentage change in the number of unionised employees partaking in either monetary-based incentive schemes or in non-monetary incentive schemes for the firm-based data sets per industry and geographic area for period t – (t-1); $\boldsymbol{\gamma Ln\%\Delta IS}_{i,t,t-1}$ is the percentage change in the index scores of the different incentives schemes for the firm-based data sets per industry and geographic area for period t – (t-1).

The proxies for the different kinds of monetary-based incentive schemes were treated as binary variables (1 if the firm had moderate monetary-based incentive schemes, 2 if the firm had strong monetary-based incentive schemes and 0 if the firm had no monetary-based incentive schemes), and proxies for the different kinds of non-monetary incentive schemes were also treated as binary variables (1 if the firm had moderate non-monetary incentive schemes, 2 if the firm had strong non-monetary incentive schemes and 0 if the firm had no non-monetary incentive schemes); $\boldsymbol{\lambda Ln\%\Delta E}_{i,t,t-1}$ is the percentage changes in the employee diversity categories (age, skill levels) partaking in incentive schemes per firm-based data sets in the various industries and geographic areas for period t – (t-1); $\boldsymbol{\mu Ln\%\Delta PR}_{i,t,t-1}$ is the ratio of the percentage change in the profitability level and the percentage change in the value of incentive schemes per firm-based data sets in the various industries and geographic areas for period t – (t-1).

Ethical considerations

Ethical clearance was approved by the School of Economics Research Ethics Committee at the University of Johannesburg with EC number 22SECO064.

Results

Fixed-effect panel data estimation results

A summary of the final fixed-effect panel data estimation results for the different industries in the four geographic areas is presented in Table 3.

The different sets of fixed-effect final panel data estimations per industry and geographic area were aimed at determining the directional and percentage impact of: (1) the size of the firm and profitability levels (via the introduction of incentive schemes) on employee productivity spillovers; (2) the different incentive schemes on employee productivity spillovers; and (3) the introduction of incentive schemes for different age groups, skill levels and the level of unionisation in the workplace on the percentage of employee productivity spillovers. Positive estimates were indicative of positive employee productivity spillovers, and greater magnitudes of the estimates were indicative of stronger employee productivity spillovers. The estimates indicated the percentage effect on employee productivity for the various variables of the different incentive schemes captured in the fixed-panel data estimations.

Discussion of the fixed-effect panel data estimation results

Outline of the results

The estimation results for the firm-based data sets indicated that increases in the size of the firm (α) and higher profitability levels (μ) had a positive impact on employee productivity (via greater levels of the introduction of incentive schemes in the workplace). This is the case for all the industries and geographic areas. For firm-size (α) the positive percentage incentive-induced differential impact on employee productivity between industries in the four geographic areas was in the same range (2.2% – 1.7% in Gauteng; 2% – 1.8% in the Western Cape; 1.8% – 1.7% in the Eastern Cape and 1.7% – 1.6% in the Northern Cape). For the level of profitability (μ) the positive percentage incentive-induced differential impact on employee productivity between industries in the four geographic areas was in the same range (2.4% – 1.9% in Gauteng; 2.1% – 2% in the Western Cape; 2.1% – 1.9% in the Eastern Cape and 1.9% – 1.8% in the Northern Cape). The estimation results confirmed similar outcomes reported by important international studies (Damiani & Ricci, 2013;

TABLE 3: Summary of the final fixed-effect panel data estimation results for variables α, β, γ, λ and μ for the different industries in the different geographic areas.

Variable estimate	Industry					
	Manufacturing		Construction		Services	
	p-value	*t*-value	*p*-value	*t*-value	*p*-value	*t*-value
Gauteng						
α_{GP}	0.021*	0.0061	0.022*	0.0078	0.017*	0.0062
μ_{GP}	0.024*	0.0077	0.021*	0.0066	0.019*	0.0054
β_{REGPU}	0.013*	0.0042	0.015*	0.0048	0.018*	0.0054
β_{NREGPU}	0.007*	0.0019	0.008*	0.0020	0.005*	0.0018
γ_{REGP}	0.011*	0.0034	0.012*	0.0041	0.009*	0.0021
γ_{NRGP}	0.008*	0.0018	0.010*	0.0028	0.007*	0.0023
$\lambda_{age<35GP}$	0.011*	0.0031	0.012*	0.0038	0.010*	0.0024
$\lambda_{age35–55GP}$	0.015*	0.0032	0.013*	0.0028	0.016*	0.0029
$\lambda_{age>55GP}$	0.012*	0.0040	0.009*	0.0024	0.012*	0.0031
$\lambda_{skill<10GP}$	0.013*	0.0034	0.014*	0.0035	0.014*	0.0032
$\lambda_{skill10–15GP}$	0.018*	0.0038	0.019*	0.0033	0.017*	0.0035
$\lambda_{skill>15GP}$	0.025*	0.0061	0.023*	0.0064	0.020*	0.0059
Western Cape						
α_{WC}	0.020*	0.0068	0.019*	0.0052	0.018*	0.0059
μ_{WC}	0.021*	0.0074	0.020*	0.0062	0.021*	0.0068
β_{REWCU}	0.012*	0.0040	0.016*	0.0050	0.017*	0.0030
β_{NREWCU}	0.009*	0.0015	0.010*	0.0022	0.012*	0.0025
γ_{REWC}	0.013*	0.0032	0.011*	0.0036	0.014*	0.0048
γ_{NRWC}	0.009*	0.0026	0.010*	0.0022	0.008*	0.0021
$\lambda_{age<35WC}$	0.010*	0.0030	0.013*	0.0038	0.012*	0.0036
$\lambda_{age35–55WC}$	0.018*	0.0046	0.016*	0.0041	0.015*	0.0039
$\lambda_{age>55WC}$	0.011*	0.0029	0.013*	0.0034	0.013*	0.0038
$\lambda_{skill<10WC}$	0.014*	0.0021	0.015*	0.0029	0.016*	0.0027
$\lambda_{skill10–15WC}$	0.016*	0.0030	0.018*	0.0032	0.017*	0.0028
$\lambda_{skill>15WC}$	0.024*	0.0047	0.021*	0.0045	0.019*	0.0039
Eastern Cape						
α_{EC}	0.018*	0.0049	0.017*	0.0051	0.018*	0.0045
μ_{EC}	0.020*	0.0066	0.019*	0.0061	0.021*	0.0058
β_{REECU}	0.013*	0.0041	0.015*	0.0040	0.018*	0.0061
β_{NREECU}	0.008*	0.0018	0.010*	0.0015	0.012*	0.0024
γ_{REC}	0.010*	0.0025	0.009*	0.0016	0.011*	0.0031
γ_{NREC}	0.008*	0.0022	0.006*	0.0016	0.009*	0.0031
$\lambda_{age<35EC}$	0.009*	0.0019	0.010*	0.0018	0.011*	0.0021
$\lambda_{age35–55EC}$	0.013*	0.0031	0.014*	0.0036	0.013*	0.0041
$\lambda_{age>55EC}$	0.010*	0.0027	0.012*	0.0042	0.012*	0.0039
$\lambda_{skill<10EC}$	0.016*	0.0033	0.017*	0.0044	0.015*	0.0035
$\lambda_{skill10–15EC}$	0.019*	0.0045	0.020*	0.0041	0.018*	0.0038
$\lambda_{skill>15EC}$	0.022*	0.0047	0.023*	0.0039	0.020*	0.0040
Northern Cape						
α_{NC}	0.016*	0.0047	0.017*	0.0039	0.016*	0.0042
μ_{NC}	0.019*	0.0060	0.018*	0.0054	0.018*	0.0057
β_{REECU}	0.010*	0.0028	0.009*	0.0025	0.012*	0.0041
β_{NRENCU}	0.007*	0.0015	0.008*	0.0022	0.009*	0.0028
γ_{RNC}	0.010*	0.0016	0.011*	0.0020	0.007*	0.0019
γ_{NRNC}	0.005*	0.0012	0.008*	0.0021	0.006*	0.0018
$\lambda_{age<35NC}$	0.010*	0.0025	0.011*	0.0019	0.011*	0.0031
$\lambda_{age35–55NC}$	0.013*	0.0022	0.014*	0.0027	0.013*	0.0033
$\lambda_{age>55NC}$	0.011*	0.0029	0.013*	0.0038	0.012*	0.0036
$\lambda_{skill<10NC}$	0.016*	0.0042	0.015*	0.0038	0.017*	0.0043
$\lambda_{skill10–15NC}$	0.019*	0.0044	0.018*	0.0049	0.020*	0.0051
$\lambda_{skill>15NC}$	0.022*	0.0055	0.020*	0.0048	0.021*	0.0053

βREU, increased participation of unionised employees in monetary-based incentive schemes; βNREU, increased participation of unionised employees in non-monetary incentive schemes; λRE, average index scores for monetary-based incentive schemes; λNER, average index scores for non-monetary incentive schemes

significant at $p \leq 0.05$*.

Gielen et al., 2010) on the positive link between increases in firm-size and firm-profitability levels and employee productivity when incentive schemes were introduced.

> Hypothesis H1 was accepted and the null-hypothesis $H1_0$ was rejected.

Important international studies such as Gielen et al. (2010) indicated that both total employee participation in incentive schemes and the level of unionisation of employees need to be considered when the differential between monetary-based and non-monetary incentive schemes is estimated (given the fact that unionised employees tend to adopt group incentive schemes). For the firm-based data sets, the fixed-effect panel data estimation results indicated a consistent greater positive impact on employee productivity for increased participation of unionised employees in monetary-based incentive schemes (β_{REU}) compared to non-monetary incentive schemes (β_{NREU}). This is true for all the industries in the four geographic areas. The positive differential impact (percentage difference between monetary-based and non-monetary incentive schemes) on employee productivity ranges from 1.3% to 0.6% in Gauteng, 0.6% – 0.3% in the Western Cape, 0.6% – 0.5% in the Eastern Cape, and 0.3% – 0.1% in the Northern Cape.

The fixed-effect panel data estimates for the firm-based data sets indicated stronger average index scores for monetary-based incentive schemes (λ_{RE}) compared to non-monetary incentive schemes (λ_{NER}). A similar pattern was observed for all the industries in the four geographic areas. The employee productivity differentials ranged from 0.3% to 0.2% in Gauteng, 0.6% – 0.1% in the Western Cape, 0.3% – 0.2% in the Eastern Cape, and 0.5% – 0.1% in the Northern Cape.

> Hypotheses H2 and H3 were accepted and the null-hypotheses $H2_0$ and $H3_0$ were rejected.

Studies such as Damiani et al. (2013), Ude and Coker (2012) and Abdulsalam et al. (2012) concluded that the middle to older employee age group and higher skilled employees have in general superior average productivity levels and that the introduction of incentive schemes enhances additional positive employee productivity differentials for these employees. The fixed-effect panel data estimates for the firm-based data sets applied in this study confirmed the superior incentive-enhanced employee productivity spillover effects for (1) the age group 35–55 years ($\lambda age35–55$) and (2) for the higher skill category ($\lambda skill>15$). The same pattern was observed for all the industries in the four geographic areas. In terms of the different age groups, the positive differential impact on employee productivity ranges from 0.6% to 0.1% in Gauteng, 0.8% – 0.2% in the Western Cape, 0.4% – 0.1% in the Eastern Cape, and 0.3% – 0.1% in the Northern Cape. In terms of different skill levels, the positive differential impact on employee productivity ranges from 1.2% to 0.3% in Gauteng, 1.0% – 0.2% in the Western Cape, 0.6% – 0.2% in the Eastern Cape, and 0.6% – 0.1% in the Northern Cape.

> Hypotheses H4 and H5 were accepted and the null-hypotheses $H4_0$ and $H5_0$ were rejected.

Practical implications of the fixed-effect panel data estimation results

It is important for HR leaders and remuneration committees to note that the effective introduction of incentive schemes in the workplace is an important vehicle to create positive employee productivity spillover effects (as indicated by the fixed-effect panel data estimates for the firm-based data sets applied in this study). The fixed-effect panel data estimates indicated that this is generally true for all firms irrespective of the kind of industry or geographic area, and an analysis of the various estimates highlighted general important managerial considerations for the optimal introduction of incentive schemes in the workplace, namely, the nature of incentive schemes, the unionised structure of the workforce, age and skill composition of the workforce and the affordability of incentive schemes (mainly determined by firm-size and firm-profitability). Furthermore, the analysis and subsequent discussion of the estimates concluded that: (1) more monetary-based incentive schemes were introduced in the workplace, and these created greater employee productivity spillovers effects compared to non-monetary incentive schemes (this was especially true for the unionised segment of the workforce); (2) the affordability of incentive schemes increased with greater levels of firm-size and firm-profitability; and (3) the introduction of incentive schemes in the middle-age grouping (between 35 years and 55 years) and higher skilled employee segment resulted in greater significant employee productivity spillover effects.

This experiment confirms that trade union membership influences collective bargaining outcomes such as improved employee participation in profit sharing, and a lack of transparency in the introduction of incentive schemes could be met with a total rejection or opposition from the employee representatives. Therefore, trust-based labour relationships play a fundamental role in the successful design and implementation of incentive schemes seeking to induce employee productivity for maximising profitability. Perhaps the most common finding is the use of monetary incentives to motivate employees and stimulate the expected behaviour to improve performance. However, this type of incentive must be augmented with non-monetary rewards focused on generating intrinsic employee behaviour that builds team cohesion, contributes to productivity improvement, and ultimately leads to increased profitability. The current shift towards hybrid-working arrangements evokes different employee expectations, requiring HR departments to be more agile in continuously identifying aspects of motivation (e.g. autonomy, job rotation, flexibility, rewards, stretch projects, productivity bonus and stock options) that induce employee productivity and use a combination of monetary and non-monetary incentives with the involvement of trade unions where appropriate.

Limitations and recommendation

This study was limited by the absence of greater pool of industries and more employee diversity attributes such as gender and race, which could be included in future research. These kinds of studies should cover the full spectrum of industry dynamics and employee attributes when the employee productivity spillover impacts of the introduction of incentive schemes in the South African workplace are analysed and estimated. A greater level of insight into employee productivity reaction patterns on the introduction of incentive schemes could be derived.

There are potentially serious data limitations to be considered and most probably a need for more sophisticated econometric applications to be applied. Also, there is a need for HR-focused research that could supply answers to decision-makers in the remuneration committees on why employees in certain age groups and skill levels generate greater employee productivity impacts when incentive schemes are introduced in the workplace. This research should provide a clear distinction on how specific monetary (performance bonuses, profit-sharing, stock options or any cash amount paid to employees) and non-monetary (autonomy, job rotation, flexible job) incentives induce employee productivity considering trade unions' involvement in the process. Lastly, it would be interesting to assess the effects of employee incentives on productivity given the hybrid-working arrangements using panel data analysis.

Conclusion

The aim of the study was to determine the nature of industry and geographic differences on incentive-induced employee productivity spillovers when firm-size, firm-profitability, different kinds of incentive schemes, level of unionisation, employee age and skill levels were considered.

The study included three different industries and four geographic areas in the South African economy. The industries were chosen primarily for their importance in the regional economies and on the basis of data availability. The four geographic areas were chosen to reflect differences in GGP. The aim of the fixed-effect panel data estimates (based on different firm-based data sets) was to provide conclusions on industry and geographic trends and differences on incentive-induced employee productivity spillovers, specifically when firm-size, firm profitability, the introduction of different monetary-based and non-monetary incentive schemes, level of unionisation, employee age and different skill levels were considered. Five hypotheses were tested and the fixed-effect panel data estimates concluded that: (1) incentive scheme-induced employee productivity spillover effects and trends were generally similar for all the different industry and geographic data sets; (2) incentive-induced employee productivity spillover effects increased with greater firm-sizes and profitability levels; (3) monetary-based incentive schemes are more prevalent in the workplace (especially for unionised employee segments) and resulted in general higher employee productivity spillovers compared to non-monetary incentive schemes; and (4) the incentive-induced productivity spillover effects are more prominent for the middle-age group (35 years–55 years) and higher skilled employees.

Therefore, HR departments must design incentive schemes with monetary and non-monetary components by taking into consideration the impact of extrinsic and intrinsic motivation on employee productivity. The successful implementation of these incentives requires a broad-based performance management system that links profitability to employee productivity measuring individual or team performance accurately based on inputs and outputs.

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Competing interests

The authors have declared that no competing interest exists.

Authors' contributions

Van Zyl, G., conceptualised the study and focused on the methodology, while the M.D.M., contributed to the conceptualisation and completed the literature review. Both authors contributed to the discussion of results, recommendations and conclusion.

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Data availability

The data that support the findings of this study are not openly available due to confidentiality and are available from the corresponding author, M.D.M., upon reasonable request.

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