

MODELLING THE IMPACT OF KEY ORGANISATIONAL FACTORS ON EMPLOYEES' AND PROCESS PERFORMANCE

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Abstract

In today's business environment, business success is dependent on an organisation's ability to efficiently leverage information and communication technologies (ICT) to support processes and improve employee performance. Previous studies have shown a significant positive relationship between these factors; however, they emphasise the need for further work to include external ecosystem variables and key determinants of business process management (BPM). To address academic calls, this study examines the relationships among these factors in the mediating context of the Performance Management System (PMS). The study is conducted on a cross-sectional sample of 167 production and service organisations. For data collection, a custom questionnaire was developed and tested. For model testing, a variance-based (PLS-SEM) approach was used, given the exploratory nature of this study. The study results point to a statistically significant, fostering power of ecosystem variables. Such power produces a substantial positive impact across the research constructs, highlighting the importance of PMS's mediating role in the process and in employees' performance.

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Key Words: Industrial Engineering and Management, Production and Service Systems, Business Process Management, Performance Management, PLS-SEM

1. INTRODUCTION

The organisation can be perceived as an open, social system, comprising the human resources and planned activities, directed toward specific goals. The organisation consists of a large number of subsystems, dynamically integrated so that changes in one subsystem often affect the behaviour of others. Managerial structures in today's companies favour organisational structures that are flexible enough to adapt to market changes, ahead of competitors, driven by innovation to maintain a high level of product and service quality, and capable of providing customer service at the highest level [1]. Process-oriented organisations focus on managers' and employees' attention to business processes, business process mapping, and process standardisation, which significantly affects both process quality and customer-focused performance [2]. Therefore, implementing process-oriented organisational structures requires a holistic approach and a better understanding of Business Process Management (BPM). BPM is a concept focused on managing change through business process improvement, encompassing the entire lifecycle, from analysis and design, through implementation, automation, and execution. BPM is seen as a set of managerial tools within software applications that enable the modelling, execution, monitoring, and presentation of business processes, integrating the functionality of information systems [3].

Every business system needs to measure, monitor, and analyse its performance. The main reason for implementing the business process's Performance Management System (PMS) is to increase its overall effectiveness. PMS is a continuous process of identifying, measuring, and developing performance, aligning organisational processes with strategic goals. Literature sources and practical implications of BPM and Process Performance Measurement (PPM) highlight the challenges of designing, standardising, implementing, controlling, monitoring, and measuring the execution of business processes, at the strategic, individual, and team levels.

Enhancements of BPM and PMS can be achieved through the application of Information Technologies (IT). Management of Information Systems (MIS) plays an essential role in the efficient management of process performance. The results of the study [4] confirm conventional thinking that MIS can be a crucial factor in companies' performance, fundamentally changing the very nature of businesses and industrial processes.

The impact of Business Process Management (BPM), Information Technology (IT), and Performance Management Systems (PMS) on company performance can be inferred from the previous studies. To manage performance variables at the process level, it is necessary to ensure that processes are installed to meet user needs, function effectively and efficiently, and align with employees' and managers' requirements [5]. Performance management improves organisational performance by enhancing employee performance at the individual and team level. According to Campbell et al. [6], employee performance is the degree to which their work is well done and aligned with their managers' expectations. The overall goal of employee performance management is to establish a high-performance culture in which individuals and teams take responsibility for the continuous improvement of business processes, as well as the responsibility for acquiring the knowledge, skills, and responsibilities needed to establish effective leadership. Team performance management is an activity that enables continuous improvement, whether through teaming, evaluations, or setting distinct goals. Previous studies underline the key factors affecting team performance, concluding that team composition, work structure, and task characteristics are the most important ones [7].

However, beyond extensive prior research, the relationships among process management, performance measurement, and employee-related performance (e.g., employee engagement) remain poorly understood and under-researched. To answer academic calls and shed light on the very nature of these crucial concepts, this study examines their interdependencies, combining them in a specific research model, where innovation and knowledge foster is a primary driver of positive effects, followed by BPM and MIS, towards the importance of PMS's mediating role, on business and employee performance.

2. LITERATURE REVIEW

Substantiation studies on the relationships regarding business process management, performance measurement systems, and organisational performance have yielded different conclusions. Some authors emphasise their positive nature [4, 8], while others disagree [9]. There is an increasing emphasis on improving performance measurement and management systems, both through the development of new theoretical approaches and practical applications, to enhance employee engagement in business processes and performance [10].

In the highly digitalised era, information technologies serve as a global technical infrastructure for creating added value through information exchange and knowledge. The relationship between Knowledge Management (KM) and BPM can be viewed as a generator, amplifier, and accelerator of value and assets [11]. Therefore, it can be assumed that KM improves BPM performance, thereby accelerating value creation through continuous business process improvement [11]. On the other hand, KM is examined within the BPM dimension, because it supports other basic processes, such as research and customer relationship management. It can be concluded that BPM produces positive effects when coupled with KM [12]. While some studies treat KM and BPM as interdependent factors, they are often conflated, since knowledge arises from business processes.

Innovation is considered key to the company's survival, differentiating it from the competition and enabling it to gain a competitive market advantage. Innovation has always played a key role in a company's long-term survival, sustainability, and global competitiveness [13]. Innovation is considered a key strategy for improving business performance amid the ever-

changing business environment. Business systems should create conditions that encourage and enable innovations in business process models. However, to produce desirable results, such innovations should be fueled with information and data. Therefore, the application of Information Technologies (IT) comes to the forefront. As the knowledge-based economy increasingly depends on the quantity and quality of information [14], the introduction and successful adoption of new information technologies (IT) have become a critical element of competitive strategy. Organisations rely on the basic business drivers (knowledge, innovation), which might have a significant impact on the development of new products, the improvement of business processes, performance enhancement, and the improvement of other company structures.

Innovation transforms information and ideas into new products and services that have value for customers and markets, thereby bringing advantages, such as added value [15]. Some authors underline that innovations significantly affect employee performance. Hasani et al. [16] concluded that innovations have a direct and significant impact on job satisfaction and can lead to greater employee creativity and improved productivity. When employees feel safe and respected in a favourable innovation climate, they have a greater sense of belonging and responsibility towards the organisation, which motivates them to be more engaged and innovative in their work. Further, applying new and innovative technologies makes employees more creative and productive. Investing in technological innovation and fostering a positive work environment are the most effective ways to improve employee performance, leading to better business results. Information technologies (IT) and Management Information Systems (MIS) fuel innovation and change in BPM. New IT includes: Cloud computing, Quantum Computing, Artificial intelligence (AI), Internet of Things (IoT), Industry 4.0, Blockchains, and Robotic Process Automation (RPA), often integrated within business processes [4]. New technologies enable the optimal use of time and resources. These new technologies are used at every step of the BPM life cycle, i.e., from modelling to monitoring and control [17]. IT technologies also affect the core elements of BPM, including strategic alignment, governance, people, and culture.

Management Information Systems (MIS) are a key component of modern business, facilitating data collection, communication, and decision-making. MIS provides managers with timely, accurate information for decision-making at the strategic and business levels. MIS support is often explicitly identified as a key enabler for PMS [18]. MIS for PMS combines two main functions: a) drawing data from various sources (including external ones) and b) using analytical tools and systems for visualising and analysing data, including presenting such results in user-friendly formats. Information management is the process of planning, organising, coordinating, identifying user needs for information, finding and evaluating sources of required information, acquiring, organising, and storing information. An organisation's information resources should align with its mission, strategies, and goals. In this context, it is necessary to connect the MIS and the PMS functionally. The basic role of MIS is to ensure the effective use of information for planning, measuring, and evaluating performance, and improving performance [19].

PMS supports decision-making and communication throughout the organisation to understand the results achieved in terms of efficiency and strategic alignment of BPM projects. Since the value of BPM depends on the organisation's goals, PMS provides a helpful framework for identifying and applying appropriate metrics [20]. The integration of PMS and BPM creates a feedback mechanism between the company's performance goals and their operationalisation. Business process performance management is the key to a successful BPM system, as a critical part of a holistic approach that can yield numerous benefits. When business process performance management is introduced into the integrated BPM system, the conditions are met for continuous process improvements [20]. Choong [21] proposed an integrated business

process management and measurement system that combines management with measurement to ensure the performance of business processes can be measured using the best IT and MIS technologies.

The company's business and production processes involve transforming and combining a set of inputs into more valuable outputs (products, services, knowledge, and employees' experience). Processes must support managers through data collection, information processing, strategy formulation and revision, process quality control, production process performance monitoring and evaluation, and people performance evaluation [22]. Moreover, processes include activities such as goal-setting, budgeting, reward, responsibility and authorisation, acceptance, facilitation, and accountability; all of which are necessary for external reporting and evaluation. The purpose of performance measurement is to measure outcomes, combined with input, output, and process measures. The goal of performance measurement is to provide grounds for organisational management decisions regarding actions that affect the product or process results, involving process optimisation to increase their efficiency and effectiveness. Hence, business processes require measurement activities at all organisational levels to capture performance inputs/outputs from process activities. Yen [23] proposed a theoretical framework that integrates measures (measurement attributes) and BP, which can be implemented to compare performance within organisational BPs. Conclusively, it can be argued that a measurement system should focus on processes rather than organisational units, because an effective process, supported by effective management, ensures business success and helps improve the company's performance in an intense, dynamic, and complex market environment.

Employee performance is a significant factor in achieving organisational goals. For this reason, it is necessary to provide a system that can reliably measure and improve employee performance. Lawler [24] defined a Performance Management System (PMS) as a system that can influence employee performance and differentiate between high and low performers. PMS, through performance planning and management, can reduce the gap between employees' planned and actual outcomes. The same author argues that employee acceptance of a PMS is a significant factor in its success and that effective PMS systems are those that employees perceive as accurate and fair. PMS means more than a list of specific practices aimed at evaluating employee performance. Instead, it is an integrated process focused on setting goals, measuring and reviewing goal achievements, providing continuous feedback, and rewarding [25]. PMS has a positive impact on employee motivation, engagement, and retention. An organisation needs a PMS that allows everyone to work together to achieve the right goals in the right way [25]. PMS accuracy refers to the degree to which the PMS provides an accurate basis for recognising employee performance, enabling performance to be improved in ways that contribute to the organisation's value.

3. HYPOTHETICAL RESEARCH MODEL

Management is a set of processes based on knowledge, skills, experience, and responsibility, including forecasting, strategy/planning, organisation and structuring of business processes, management, flow control, performance measurement, and process improvement. Management tasks are complex to resolve and often require the synergistic integration of various organisational factors. The literature review from the previous section serves as the basis for determining the key factors necessary for the company's survival and development. These are: a) Innovation and Knowledge (IK), b) Management Information Systems (MIS), c) Business Process Management (BPM), d) Performance Management Systems (PMS), e) Individual and Team Performance (ITP), and f) Process Performance (PP). Relationships and influences among Business Process Management (BPM), Performance Management Systems (PMS), and organisational performance have been studied by many authors, who have reached different

conclusions. Many authors believe that the links between innovation, Business Process Management (BPM), performance measurement and management, and employee engagement have not been sufficiently explored [4, 18, 25]. Therefore, the influence of these key factors on improving business process performance, along with the nature of their interdependences, is the main subject of this study.

3.1 Questionnaire development

The research was conducted on a cross-sectional sample of 167 respondents from various production and service organisations. Respondents were selected from multiple managerial positions, including employees involved in Business Process Management (BPM). The study was conducted in the Republic of Serbia and in Western European countries. A custom questionnaire was developed, based on previous studies and relevant literature recommendations. Faculty members and industry practitioners evaluated the questionnaire's content validity. According to their recommendations, minor corrections were made. The final questionnaire consisted of six constructs (dimensions). The initial version of the questionnaire contained 56 questions (manifest variables) divided into six constructs, as shown in Table I. For the data collection responses, a five-point Likert scale was used [26]. Responses were collected over 8 months via an electronic questionnaire.

Table I: The research questionnaire structure.

Abbreviated	Constructs	No. of items
IK	Innovation and Knowledge	8
BPM	Business Process Management	9
MIS	Management Information Systems	9
PMS	Performance Management System	10
PP	Process Performance	10
I(E)P	Individual (employee) performance	10

3.2 The hypothetical model

In the introduction and literature review sections, significant studies provide a basis for modelling the relationships between key organisational factors and their influence on business processes and individual (employee) performance. While KM and BPM are often seen as interdependent, in this study, they are coupled because knowledge must be acquired through business processes [12]. Innovations and knowledge positively and intensively influence Management Information Systems (MIS), transforming them from data storage systems into strategic tools for achieving competitive advantage. Research by specific authors indicates that innovations positively affect employee performance [15, 16]. MIS positively affects BPM [17]. The basic role of MIS is to ensure the effective use of information for planning, measuring, and evaluating performance, and improving performance [19]. Performance management of business processes is included in the integrated BPM approach. Lawler [24] defined the performance management system (PMS) as a system that can positively influence employee performance. Employees' performance directly influences the performance of business processes. Highly engaged, highly effective staff increase productivity, efficiency, innovation, and quality in the organisation. Based on these literature discussions, the hypothetical model was developed, as shown in Fig. 1.

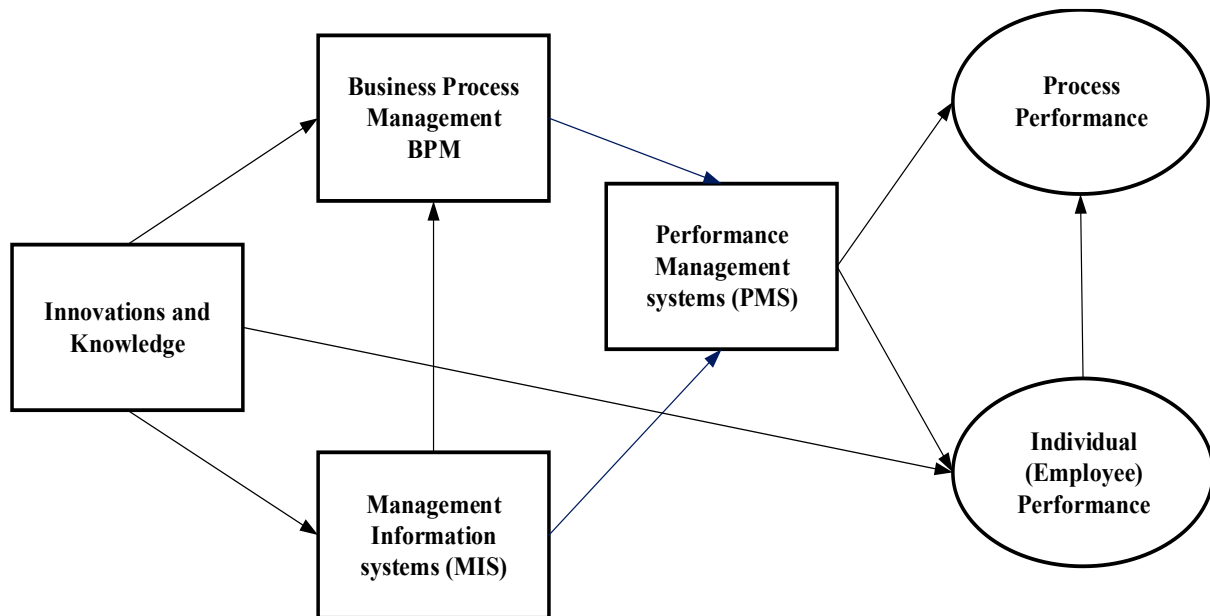


Figure 1: The hypothetical model.

4. MODELLING RESULTS

For modelling purposes, the PLS-SEM method was chosen because it is suitable for exploratory studies with relatively small samples and can yield stable, reliable results even when the data do not fully meet normality assumptions [26]. In such cases, PLS-SEM provides more stable parameter estimates and a stronger basis for statistical inference [26].

4.1 The measurement model

To test the measurement model, a confirmatory factor analysis (CFA) was conducted in accordance with Hair et al. [26], including tests of internal consistency, convergent validity, and discriminant validity. Internal consistency was assessed using Cronbach's alpha (α). In exploratory research, reliability coefficients of 0.7 or higher are considered satisfactory, as was the case in this study, except for the items removed. Convergent validity was assessed using the manifest variables' factor loadings (λ coefficients, i.e., outer loadings) and the Average Variance Extracted (*AVE*). It is recommended that λ values should be at least 0.7 and statistically significant ($t \geq 1.96$), while for *AVE*, the value must be at least 0.5 [26]. In this study, these values were in accordance with literature recommendations. Also, the discriminant validity was checked using the Fornell-Larcker criterion. This criterion implies that the square root of the *AVE* value of a construct must be higher than its highest correlation with any other construct [26]. Also, cross-loadings of manifest variables with other constructs should be lower than their loadings on the respective assumed constructs [26]. The results in this study have yielded satisfactory values in favour of these criteria.

4.2 The structural model

Structural model consistency was evaluated using the variance inflation factor (*VIF*) and the determination coefficient (R^2) [26]. First, collinearity between predictors was checked using *VIF* coefficients ($VIF \leq 3-5$), where all indicators were below 3.3, indicating that multicollinearity is not an issue. Then, the constructs' coefficient of determination (R^2) was considered as a measure of the explained variance ($R^2 \geq 30-40$). R^2 values were satisfactory. Furthermore, the coefficients for the relationships among the constructs were statistically

significant. Moreover, the total and specific indirect effects were also examined, yielding statistically significant total effects. These values are shown in Table II.

Table II: The values of the total influence of the connection between the construct.

From → To	Total effects
BPM → PMS	0.468
BPM → PP	0.230
BPM → I(E)P	0.098
IK → BPM	0.731
IK → MIS	0.676
IK → PMS	0.599
IK → PP	0.530
IK → I(E)P	0.569
MIS → BPM	0.554
MIS → PMS	0.639
MIS → PP	0.315
MIS → I(E)P	0.135
PMS → PP	0.492
PMS → I(E)P	0.210
I(E)P → PP	0.531

The structural model with the relationships' values is shown in Fig. 2.

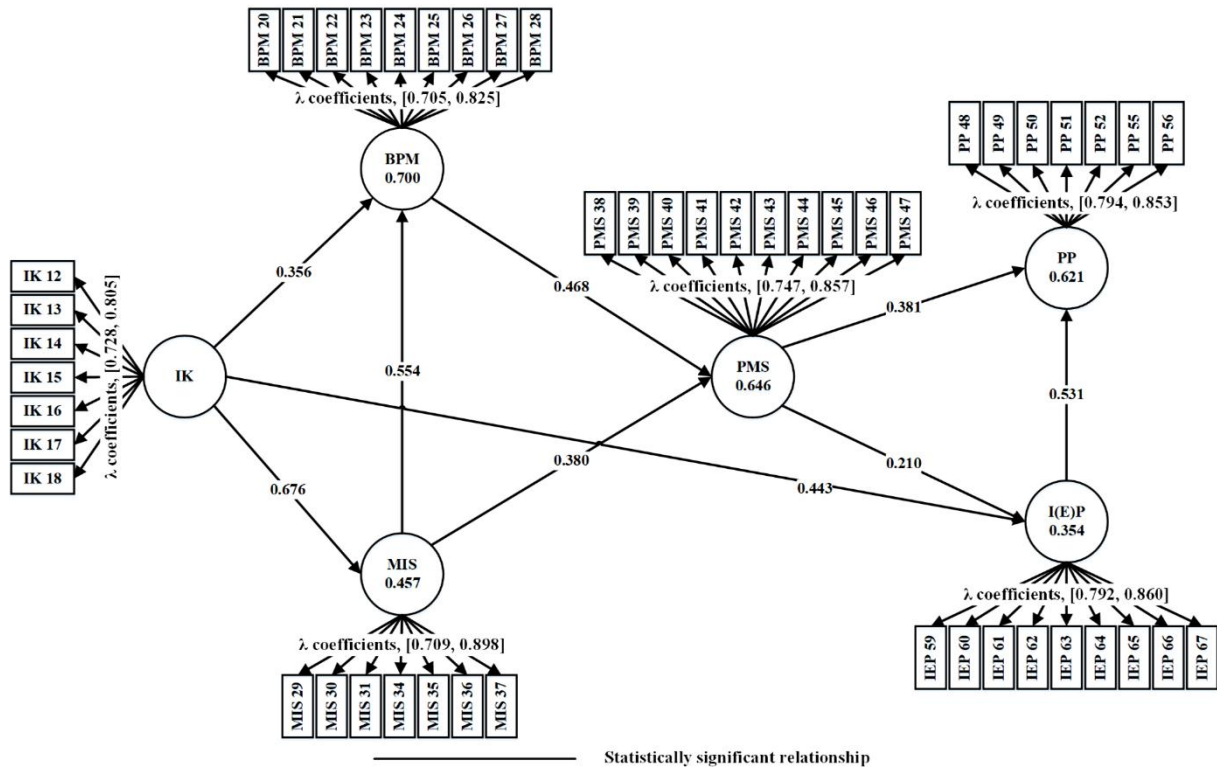


Figure 2: The structural model.

Based on the data presented in Table III and Fig. 2, the assumptions regarding the positive effects among the research constructs were confirmed. To test the statistical significance of the relationships between research constructs ($t \geq 1.96$), a bootstrap method with 5000 subsamples was used [26]. Table III shows the total effects (direct and indirect) and the statistical significance of the relationships between constructs.

Table III: The Statistical significance of the direct and indirect effects between constructs.

From → To	Original sample (O)	Sample mean (M)	Standard deviation	T statistics (O/STDEV)	P values
BPM → PMS	0.468	0.471	0.064	7.296	0.000
BPM → PP	0.230	0.234	0.046	4.965	0.000
BPM → I(E)P	0.098	0.101	0.040	2.450	0.007
IK → BPM	0.731	0.733	0.031	23.481	0.000
IK → MIS	0.676	0.679	0.036	19.000	0.000
IK → PMS	0.599	0.603	0.038	15.705	0.000
IK → PP	0.530	0.535	0.044	12.120	0.000
IK → I(E)P	0.569	0.570	0.054	10.438	0.000
MIS → BPM	0.554	0.554	0.062	8.903	0.000
MIS → PMS	0.639	0.640	0.047	13.512	0.000
MIS → PP	0.315	0.318	0.054	5.877	0.000
MIS → I(E)P	0.135	0.137	0.052	2.604	0.005
PMS → PP	0.492	0.497	0.068	7.204	0.000
PMS → I(E)P	0.210	0.214	0.079	2.672	0.004
I(E)P → PP	0.531	0.529	0.055	9.713	0.000

5. DISCUSSION AND CONCLUSION

The main goal of this research was to analyse the mutual influences of the organisation's key factors on Individual (Employee) Performance (IP) and business Process Performance (PP). The results support the findings of other authors. However, further studies are needed to examine the nature of relationships among research constructs. The independent variable – Innovation and Knowledge (IK), influences other constructs, enhancing their direct and indirect positive effects. Therefore, Innovations and Knowledge (IK) have a positive, high impact on Business Process Management (BPM) and Management Information Systems (MIS). At the same time, Performance Management Systems (PMS) serve as a strong mediating factor towards PP and Individual (Employee) Performance (IP). These findings are consistent with the conclusions of many authors [11-13], who underline that Innovation and Knowledge (IK) have a significant impact on improving business processes, management, and performance, reflecting a positive effect on other organisational structures. Innovations have an equally significant positive impact on Management Information Systems (MIS). Innovation and knowledge are intensively influencing Management Information Systems (MIS) by transforming them from data storage systems into strategic tools for achieving competitive advantage. This research shows that MIS has a positive impact on the successful implementation and functioning of BPM and PMS. The results of Chae et al. [4] indicate that the Management Information Systems (MIS) play a crucial role in achieving effective Business Process Management (BPM), Process Performance (PP), and Individual (Employee) Performance (IP).

New IT technologies are used at every phase of the BPM life cycle, and many authors consider MIS a key enabler for PMS [4, 17, 18]. Rahimi et al. [27] argue for horizontal alignment between BPM and MIS to align strategic and operational business process decisions. The key role in this model is underlined by the significant positive influence of the Performance Management System (PMS) on other constructs. Bosilj-Vukšić et al. [28] concluded that BPM is more successful in organisations that define their process measures and implement PMS. Given that process performance measures play an essential role in the successful adoption of BPM, companies should understand the value of PMS and should be thoroughly familiar with its features.

An effective PMS connects business intelligence with real-time planning, budgeting, and monitoring, and with the underlying technology for determining Individual (Employee) and business Process Performance (PP), thereby demonstrating the success of an organisation's operations [29]. Kolbacher and Reijers [30] show that employee performance positively impacts the success of the organisation's business processes. Moreover, a positive relationship between Employee (IP) and business Process Performance (PP) suggests that engaged employees lead to better organisational outcomes [31]. Many organisations look at results only in financial terms [32]. However, Kaye and Anderson [33] conclude that results are passing financial ones, and should be viewed in terms of organisational, team, and individual performance. The results of this study provide empirical evidence that key organisational factors positively influence business process performance. Innovation and Knowledge (IK) has the most significant, holistic impact on all constructs, namely, Business Process Management (BPM), Management Information Systems (MIS), Performance Management Systems (PMS), Individual (Employee) Performance (IP), and Process Performance (PP). Also, it should be noted that these results confirm previous findings, where performance management plays an important role [34, 35]. In conclusion, the results of this study underline the importance of the research constructs examined in the specific context of a research model. However, they also raise further questions about the nature of relationships between technology, human resources, and organisational performance.

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