Business process management, data analysis technology, and business process performance: An interpretive qualitative study

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Abstract

Purpose: This study explores how practitioners interpret the connections among Business Process Management (BPM), Data Analysis Technology (DAT) and Business Process Performance (BPP), including the roles of Artificial Intelligence (AI), Business Intelligence (BI) and Advanced Analytics (AA) as DAT's enabler.

Design/methodology/approach: Semi-structured interviews were conducted with 12 experts from higher education and logistics within an interpretivist, exploratory design. Data were analysed in NVivo 15 through deductive thematic analysis using BPM phases, DAT categories and BPP dimensions as sensitizing concepts.

Findings: Participants described identification, analysis and monitoring as the phases where BPM became visible in everyday work and connected them with accurate, timely processes. They saw AI and BI as supporting reporting, automation, decision-making and timely responses. Implementation accounts emphasized resistance and coordination difficulties, while AA appeared mainly in decision support. These contextualized accounts do not establish causal effects.

Implications: Organizations may benefit from moving toward data-informed BPM, building BI, AI and AA tools into redesign and monitoring routines to support operational visibility and responsiveness.

Limitations and future research: The interpretations rest on self-reported accounts from two settings. Read through the Resource-Based View (RBV) Theory and Cognitive Psychology Theory (CPT), the accounts suggest that BPM and DAT were understood as complementary capabilities, with DAT supporting managerial judgment by condensing process data.

Originality/value: This study shows that social mission and social change-making enhance community empowerment through dynamic capability, driven by organisations' ability to adapt and reconfigure capabilities into sustainable outcomes.

Keywords: Business Process Management, Data Analysis Technology, Business Process Performance, Artificial Intelligence, Business Intelligence, Advanced Analytics.

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Introduction

The pace of change and competition in today's business environment poses significant challenges for organizations, made even more difficult by advances in technology (Teixeira et al., 2024). In these ever-changing contexts, companies are increasingly adopting more formal approaches to process management (Szelągowski & Berniak-Woźny, 2024). Business Process Management (BPM) has traditionally been used to optimise processes, eliminate waste and ensure that activities are aligned to key business goals (Scavarda et al., 2025). But as businesses grow, the use of BPM has evolved with an increasing emphasis on digital transformation and the adoption of new technologies to drive business success. This development underscores the intricate relationship between BPM, data and performance. In

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the digital age, companies are now leveraging DAT to maximise the value of their business processes performance. DAT consists of applications, tools, software and processes including business intelligence, artificial intelligence, advanced analytics, machine learning and statistical analysis that convert raw data into actionable insights not only for decision-making but other related elements as well (Joel & Oguanobi, 2024). DAT with its capacity to offer real-time monitoring, automate mundane activities and deliver insights and guidelines becomes a vital component in the process of making better decisions, improving customer relationships and creating more predictive business operations (Joel & Oguanobi, 2024).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

The use of Business Intelligence (BI), Artificial Intelligence (AI) and Advanced Analytics (AA) tools integrated with BPM practices help organizations move from a reactive, process-centred approach to a proactive, data-centred approach (Eboigbe et al., 2023) enable organizations to not only assess their operational efficiency but also to gain insights that allow them to make informed decisions, helping them to detect trends, predict problems and take advantage of opportunities.

Although there is a general awareness of the benefits of integrating BPM with DAT, many businesses continue to face challenges in realising these benefits. Several factors make the integration of DAT into BPM processes difficult (Majumdar & Mitra, 2024; Moreira & Dallavalle, 2024). Silos, data overload and a reluctance to embrace new technologies can hinder the success of BPM efforts. Often, while companies may experience efficiency gains at the operational level, they don't reap the benefits of real-time, dynamic decision-making that are needed to succeed in the digital economy (Indihar Štemberger et al., 2024; Novak et al., 2023). Therefore, managing processes is not the problem, but the question is how can processes be re-imagined using advanced technologies. However, how DAT enables the link between BPM and BPP remains poorly understood (Sun et al., 2025; Sun & Abdullahi Usman, 2025). This study takes a step toward filling this gap by exploring how practitioners understand the role of data analysis technologies within BPM and its connection to process performance. Existing research has explored BPM and DAT in isolation (Szelągowski & Berniak-Woźny, 2024), but little research has focused on the interrelationship between these two areas, especially in terms of how DAT acts as an enabler that links BPM initiatives to BPP. This research therefore offers insight into tools and techniques that enable organisations to evolve from process standardisation to data-driven responsiveness (Huang et al., 2022). Accordingly, the purpose of this study is to understand how participants interpret the connections among BPM, DAT and BPP, including how they describe the contribution of real-time data gathering, predictive analysis and automated decision-making to everyday process work.

Process performance also matters for business sustainability. Less delay, rework and waste results in less resource consumption and enables organisations to continue serving customers and/or students when conditions change, helping to support the economic continuity that underpins broader sustainability commitments (Ahmad & Van Looy, 2020; Allumi et al., 2025). The study does not examine environmental or social outcomes. Its contribution is to interpret how practitioners connect process discipline and data analysis with the operational performance on which sustainable business depends. Three questions guide the study:

RQ1: How do participants describe the contribution of different BPM lifecycle phases to business process performance dimensions?

RQ2: How do participants understand the role of DAT as BI, AI and AA enabler within BPM practices to business process performance dimensions?

RQ3: How do these accounts vary between higher education and logistics settings?

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In this research, the business environment is the set of two different sectors: higher education and logistics. These two areas were selected as they have different perspectives on BPM and the difficulties they encountered in implementing DAT to improve their business. Even though the processes can be improved with the application of new technologies, the higher education sector faces challenges in integrating processes with new technologies, and there is a need for further research in this area (Pasaribu et al., 2021; Souza et al., 2022). In comparison, the logistics sector, which has a strong interest in process improvement, is becoming more reliant on DAT for process optimisation and quality improvement of services offered (Moskvichenko et al., 2024). These industries provide evidence on the connection between BPM and DAT and suggest the importance of developing specific strategies for introducing process management and new technologies (Gutiérrez et al., 2023; Levin & Datnow, 2012).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

The study makes two contributions. Theoretically, it uses RBV and CPT as interpretive lenses to understand why participants regarded BPM and DAT as valuable in combination and how they described that combination as supporting process-level decisions. Empirically, it offers contextualized accounts of how practitioners in higher education and logistics connect BPM lifecycle phases and DAT tools with process performance, and of how these accounts differ between the two settings.

Literature review

Underlying theories

The study draws on two complementary theories that operate at different levels of analysis. The first is the Resource-based View (RBV) by Barney (1991) that holds that firms gain competitive advantage from acquiring and assembling valuable, rare, in-imitable and non-substitutable resources. BPM is an (organizational) capability which structures, controls and redesigns company processes, whereas DAT refers to data as a technological based resource turning raw information into useful knowledge (Patnaik et al., 2022; Taher, 2011).

The second theory, Cognitive Psychology Theory (CPT) as applied to managerial judgment (Gigerenzer, 1991) explains how BPM and DAT work to bring about higher performance. Organizational decisions frequently do not result in optimal solutions, due to information overload, bounded rationality and cognitive bias. Process management addresses these issues by organizing work, assigning responsibility and defining decision paths (Solso, 2024). DAT provides an additional avenue of support by relieving managers and employees from excessive cognitive demands. Predictive analytics, dashboards and artificial intelligence software can bring cluttered data to life for easier consumption, revealing patterns and even predicting the future (Evans et al., 2024). This support helps decision makers make decisions faster, more accurately and with increased confidence. Taking a CPT perspective, DAT functions as an exterior cognitive aid to overcome cognitive limitation of humans performing the task and improves the organization of judgment (Joel & Oguanobi, 2024).

The two theories have different roles. RBV operates at the organizational level and is a good explanation of why BPM and DAT are worth using together that is BPM is a process capability and DAT is a technological resource that can be valuable when embedded within firm-specific processes or routines. CPT operates at the managerial decision-making level and describes how this combination enhances performance; structured processes help to narrow the decision space and analytical tools help to reduce the information overload for decision makers. Both theories are used in this qualitative study as lenses through which to interpret, not as hypotheses to be tested.

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Business Process Management (BPM)

Business Process Management (BPM) is already widely recognized as a life-cycle approach to the design, enactment, monitoring and improvement of processes in organizations to achieve consistent performance outcomes (Scavarda et al., 2025). BPM is made up of several stages, such as identification, discovery, analysis, reengineering, implementation and monitoring, all of which contribute to enhancing the quality and efficiency of procedures to improve business process performance (Ubaid & Dweiri, 2020). BPM's identification, discovery and analysis phases support the mapping of processes, the identification of process owners and process boundaries and improve coordination and visibility. These early activities help to better manage processes by identifying process details prior to the commencement of process improvement activities (Zuhaira & Ahmad, 2021). The analysis stage of BPM is the key one as it addresses bottlenecks, inefficiencies and resource misallocations, allowing managers to make informed decisions. Process reengineering focuses on substantially redesigning processes to improve speed, quality and flexibility, often using new technologies to enhance performance (Scavarda et al., 2025). The execution phase involves putting new processes in place to implement strategic goals and performance monitoring and control ensures improved performance levels are sustained through feedback and adjustment (Zuhaira & Ahmad, 2021).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Data Analysis Technology (DAT)

Data Analysis Technology (DAT) is a critical organizational capability, enhancing the complexity, responsiveness and adaptability of processes (Awotunde et al., 2022). DAT includes Business Intelligence (BI), Advanced Analytics (AA) and Artificial Intelligence (AI) tools that enable organizations to gain insight into large volumes of structured and unstructured data for descriptive, predictive and prescriptive purposes (Khan, 2025).

The three categories are differentiated here by their function. Business Intelligence (BI) involves the management of and reporting on past events, including through the use of dashboards, scheduled reports and data visualization to enable managers to monitor operations (Shatat et al., 2024); structured data modelling has been seen to be able to accelerate decision-making when using it as a component of Business Intelligence (Adeyemi et al., 2026). Advanced Analytics (AA) refers to the statistical and model-based methods used by analysts to predict what will happen or what should be done (forecasting, simulation and optimization). Artificial Intelligence (AI) refers to systems that learn from data or make decisions and perform actions with minimal human input, including machine learning models, intelligent automation and chatbots. These definitions were also used as coding rules: passages reporting or viewing data were coded as BI, passages detailing analyst-built models as AA, and passages in which the system learns or acts independently as AI. Together, these DAT tools support the use of agile analytics to address today's challenges (Gad-Elrab, 2021). DAT can also help managers cope with cognitive limitations in complex decision-making tasks (Theodorakopoulos et al., 2025), as it helps them to integrate and summarize large data sets thereby reducing the amount of information they have to process themselves.

Business Process Performance (BPP)

Business Process Performance (BPP) is the ability to achieve desired outcomes in terms of efficiency, accuracy, timeliness, customer service, decision-making support and marketing responsiveness (Van Looy & Shafagatova, 2016). In this study marketing is not regarded as a functional department, but rather as a process outcome. It is used to describe the outcomes of processes that are relevant to the market, for example, attracting, converting and keeping customers or students and reacting to demand signals. In higher education, this is seen in



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student recruitment and agent monitoring and conversion rates and in logistics, it is seen in campaigns based on data and customer relationship management. Because participants in both sectors (including those in marketing and CRM roles: P3, P4, P6 and P11) connected process data with these outcomes, Marketing was retained as a BPP dimension for both settings. BPP is not a firm performance indicator like financial performance, but rather an indicator of the effectiveness of the processes of the firms in terms of their reliability and competitiveness (Aydiner et al., 2019). The key components of BPP are Timeliness and Efficiency; delays and waste of resources may affect the quality of the service and customer experience. In the logistics and mass transit sectors, the implementation of data-driven and intelligent technologies has demonstrated a substantial ability to tackle operational constraints, cut expenses and boost sustainable service provision (Allumi et al., 2025). With errors in reporting, forecasting or executing processes having an impact on downstream aspects, reliability is also of critical importance, particularly in data-driven environments (Wetzstein et al., 2009). Customer service performance is another crucial element of BPP and relies on consistency, responsiveness and transparency of the process interactions. The quality of decision-making is beginning to be considered as a BPP outcome as well, because good decisions enable organizations to deal with uncertainty and change (Žemgulienė & Valukonis, 2018). Researchers propose that BPP should be considered as a product of a combination of formalized process control and data analytics. BPM offers the structure needed for process discipline and DAT offer real-time intelligence and automation, allowing companies to achieve optimal BPP in several areas. This holistic approach is consistent with the resource-based view, which stresses the importance of leveraging complementary resources to achieve superior performance (Žemgulienė & Valukonis, 2018).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Consistent with the interpretivist design, the concepts reviewed above are not treated as variables whose relationships are to be verified. They serve instead as sensitizing concepts (Blumer, 1954; Bowen, 2006) which directed the researchers' attention when reading the interviews and helped organize the meanings participants attached to their work. Two sensitizing concepts arise from the preceding discussion.

SC1 - BPM lifecycle phases: identification, discovery, analysis, reengineering, implementation and monitoring and controlling were used to notice how participants described each phase in everyday process work and which performance outcomes, if any, they connected with it.

SC2 - BPP dimensions: accuracy, customer services, decision making, efficiency, marketing and timeliness were used to recognize the outcomes participants referred to when judging whether a process was performing well.

Data Analysis Technology as an Enabler

DAT is an enabler that adds intelligence, automation and prediction to BPM. BI, AI and AA tools allow us to gain better insights, automate processes and improve the processes of the business in ways that are not possible with BPM alone (Eboigbe et al., 2023). In the initial phases of BPM, DAT adds value to the discovery and identification process by leveraging data from operations to detect anomalies and patterns. In the analysis stage, DAT helps BPM to anticipate effects and consequences of process changes and to model new scenarios. During reengineering, AI solutions model processes and allocate resources effectively and AI-driven automation minimizes the need for human intervention and errors in implementation (Zong & Guan, 2025). Lastly, DAT enhances monitoring and control with real-time dashboards, predictive warnings and automated reporting, ensuring that processes are efficient and meet performance objectives (Tsoury et al., 2020).

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BPM supports the organisation in structuring their business processes architecture, but it is not sufficient to capture all dynamic elements of business in today's business landscape. Traditional BPM frameworks sometimes are limited by the need to be flexible, as technology evolves and customer expectations shift and unexpected disruptions in the market occur. Hence, it is imperative for organizations to integrate adaptive strategies as well as real-time digital analytics to make the process more responsive and continuously improved. The addition of intelligence, automation and prediction in BPM (Bussa, 2023; Zong & Guan, 2025) is embodied in DAT, which includes BI, AI and AA applications. The enabling role is important since BPM alone provides standardization, while DAT provides flexibility in adjusting processes when circumstances change. Business intelligence dashboards give managers a snapshot of the workflows so they can prioritize improvement based on what they see, not what they assume, which can lead to better results (Al-Okaily et al., 2023). This minimizes the dangers of reengineering and provides for designs that are based on realistic predictions, not assumptions. (Tsoury et al., 2020).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

With DAT, the monitoring feedback loop becomes predictive rather than reactive, meaning that problems can be anticipated before they emerge (Márquez-Chamorro et al., 2017; Nargesi & Bazaee, 2023). Predictive and prescriptive analytics inform and guide decisions, real-time response enhances customer service, automation frees time, trend analysis guides what to do in the market and automated execution eliminates errors (Zong & Guan, 2025). In summary, the literature positions DAT as an element that can help turn BPM structure into adaptive performance, a view that informs the third sensitizing concept.

SC3 - DAT categories: BI, AI and AA, distinguished by the functional definitions given earlier, were used to notice the roles participants attributed to each type of tool within BPM practice, including accounts in which a tool was not used or did not meet expectations. Figure 1 presents the interpretive framework that guided the analysis. It shows the three sensitizing concepts and the connections among them that participants were invited to discuss. The connecting lines are non-directional because they mark areas of meaning explored in the interviews rather than causal paths.

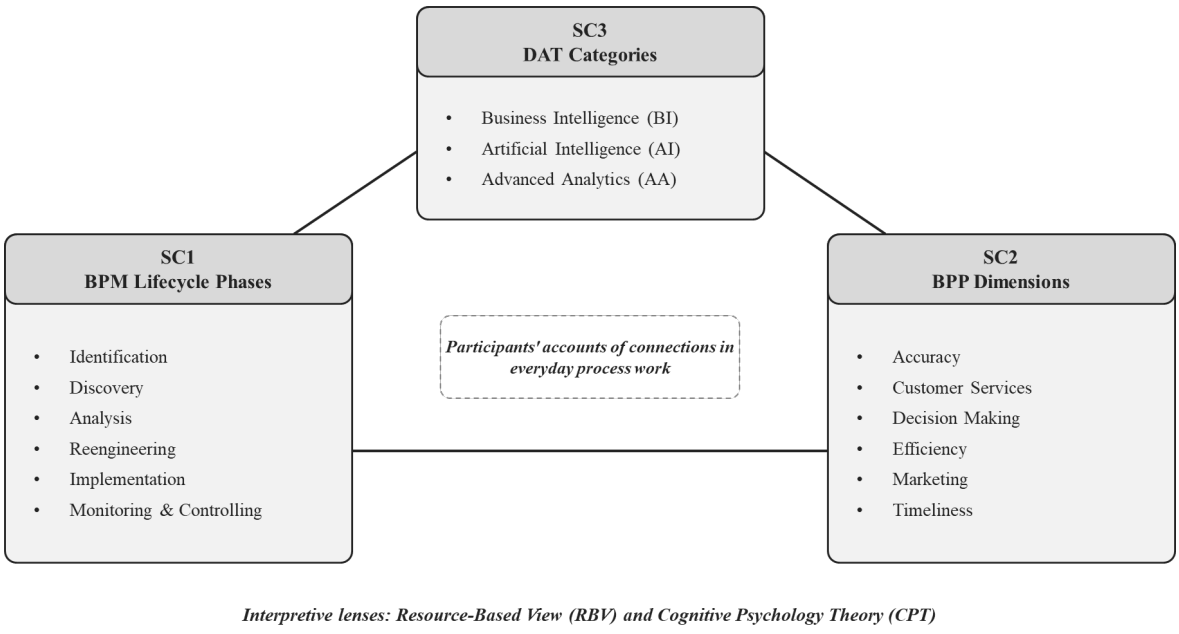


Figure 1. Interpretive Framework of Sensitizing Concepts: BPM Lifecycle Phases, DAT Categories and BPP Dimensions

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Methodology

Research Philosophy and Interpretivist Stance

The research philosophy for this study is interpretivist. The study seeks to understand how practitioners interpret the connections between Business Process Management (BPM) practices and Business Process Performance (BPP), and the role they attribute to Data Analysis Technology (DAT) within those practices (Patnaik et al., 2022). Interpretivism views organizational reality as socially constructed by the subjective meanings, interpretations and actions of organizational actors (Gibbs, 2018). The study of process management and technological integration should consider the perceptions, experiences and operationalization of process management and technological integration by managers, analysts and domain experts in their institutional settings (Kiger & Varpio, 2020). The interpretivist paradigm does not presume universal causal laws but rather seeks to understand the interaction between the technological tools and the organizational work routines and human decision making in a context-specific manner (Miles et al., 2014). This philosophy is directly related to the theories of Cognitive Psychology Theory and Resource Based View, both of which focus on cognitive limitations of human beings, managerial perceptions and resource deployment within the firm (Gigerenzer, 1991; Solso, 2024; Taher, 2011).

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Research Design, Strategy and Organizational Context

An exploratory, cross-sectional qualitative design was used to understand how participants experienced the interdependencies among BPM, DAT and BPP (Elliott, 2022; Miles et al., 2014). Qualitative inquiry is useful for exploring complex organizational phenomena where the theoretical interaction and contextual boundary are changing (Bazeley, 2021). A cross-sectional time horizon allowed for a careful and comprehensive comparative snapshot of process management maturity and technology adoption at a single time in the organization's development (Patnaik et al., 2022).

The empirical investigation was carried out in two different and contrasting sectors namely higher education (public university) and logistics (commercial courier enterprise) (Moskvichenko et al., 2024; Pasaribu et al., 2021). These sectors were chosen for their distinct organizational models, administrative cultures and technological implementation patterns (Gutiérrez et al., 2023; Souza et al., 2022). Higher education is a highly bureaucracy-heavy, process-driven field where decision-making and execution is highly decentralized, manual processes exist (such as student enrolment and curriculum approvals) and information systems are not centralized (Bandara et al., 2010; Pasaribu et al., 2021). On the other hand, the logistics industry is an automated, competitive and time sensitive industry that relies on real-time tracking, fast query resolution and route optimization (Moskvichenko et al., 2024). Comparing these contrasting environments offers multi-sector viewpoints on how participants described the use of DAT in settings with different levels of organizational readiness.

Sampling Protocol, Expert Selection and Data Collection

A total of 12 experts were purposefully selected who had experience with both business process activities and data analysis technologies within their organizations and were used in semi-structured interviews. This included 6 who worked in higher education (P2, P3, P5, P6, P7 and P10) in university administration, international admissions, recruitment and marketing, forecasting and operations (e.g. StudyLink and Power BI). Three worked in logistics (P1, P8 and P9), supply chain management, warehouse optimization and implementing ERP and dashboard. The remaining three (P4, P11 and P12) had embraced DAT in both sectors as business intelligence, marketing analytics and business process analysis specialists.

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Information adequacy was judged using the information power model (Malterud et al., 2016). The narrow study aim, the participants' direct experience of both BPM and DAT, and the depth of the interview dialogue meant that 12 specialized participants offered sufficient information power for the study's purpose.

Formal ethics approval was received from the Federation University Human Research Ethics Committee (Reference Number: B20-015) before data collection was begun. Each participant was provided with a Plain Language Information Statement (PLIS) that provided information on the study's research objectives, voluntary participation rights, audio/video recording protocols and data anonymisation procedures. All sessions began after obtaining formal informed consent.

International Journal of Business Sustainability

Volume: 2,
Issue: 2, 2026

Interviews were performed using secured video conferencing platforms for a duration of 45 to 75 minutes. The semi-structured interview protocol was structured on the main research themes and was flexible enough to gain insight into emergent themes (Kiger & Varpio, 2020). The discussion focused on experiences of the participants throughout the six steps of the BPM lifecycle, the practical use of BI, AI and AA technologies and their perceptions of how these practices related to process performance. All sessions were audio-visually recorded, verbatim-transcribed and cross-referenced with the primary audio tracks for the precision and integrity of the transcription (Gibbs, 2018).

Data Analysis

The analysis of qualitative data was conducted deductively, following the framework of Braun and Clarke (2006, 2021) and implemented in NVivo 15 qualitative data analysis software (Elliott, 2022; Feng & Behar-Horenstein, 2019). Deductive thematic analysis starts with a priori theoretical constructs, based on the research question and literature models, to systematically organize the code generation and data interpretation (Braun & Clarke, 2006). This method is used to ensure conceptual alignment and open to emergent qualitative patterns.

The coding structure was established hierarchically around three parent nodes and fifteen child nodes corresponding to the three sensitizing concepts (Bazeley, 2021):

1. BPM Lifecycle Components (Parent Node): Child nodes comprised Identification, Discovery, Analysis, Reengineering, Implementation and Monitoring & Controlling (Scavarda et al., 2025; Zuhaira & Ahmad, 2021).
2. Data Analysis Technology Dimensions (Parent Node): Child nodes comprised Business Intelligence (BI), Artificial Intelligence (AI) and Advanced Analytics (AA) (Khan, 2025; Zong & Guan, 2025).
3. Business Process Performance Outcomes (Parent Node): Child nodes comprised Accuracy, Customer Services, Decision Making, Efficiency, Marketing and Timeliness (Van Looy & Shafagatova, 2016).

Data analysis followed a four-step analytical workflow (Braun & Clarke, 2006; Feng & Behar-Horenstein, 2019):

1. Data Familiarization: Research transcripts and secondary organizational documents were read repeatedly to build comprehensive contextual familiarity.
2. Initial Node Assignment: Transcript text segments were systematically parsed and assigned to relevant pre-defined parent and child nodes in NVivo 15.
3. Coding Refinement and Reflexive Review: Node definitions were refined iteratively, and coded passages were revisited to check that each code carried the same meaning across

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transcripts. Consistent with Braun and Clarke (2021), this review aimed at a coherent and well-documented interpretation, not at coder agreement as proof of objectivity.

4. Theme Development: Coded passages were read in their interview context and developed into interpretive themes. NVivo matrix queries were used only to retrieve and compare passages across phases, tools, outcomes and sectors.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

The unit of coding was the meaning unit which is a passage as short as possible with a full sense of meaning (idea) concerning a process phase, a tool or a performance outcome. A passage was coded to more than one node when it described more than one construct which is why one passage can appear in several matrix cells. Divergent accounts, such as reports that a phase had not worked well or that a tool was not used, were retained and are reported in the Results as contrasting cases. No organizational documents were coded; they were only used to validate participants' descriptions of processes and tools.

Interpretive Framework Mapping and Comparison of Coded Accounts

NVivo matrix queries were used as organizational aids to locate passages in which participants discussed BPM phases, DAT tools and performance outcomes together (Bazeley, 2021). The matrices supported the retrieval and comparison of accounts, but code co-occurrence was not treated as evidence of causal strength or statistical association. Interpretations were developed through close reading of the relevant passages, attention to context, and comparison of convergent and divergent accounts.

The coding records produced by these queries are retained in Appendix A as part of the audit trail. They show where participants' talk touched on particular combinations of concepts, a pattern that may also reflect the structure of the interview guide and the length of individual interviews. They are not used as evidence of the importance of any phase, tool or outcome.

The comparison of the coded accounts proceeded in two stages. First, passages in which participants talked about BPM lifecycle phases along with performance outcomes were read together and the way participants described the contribution of each of the phases was understood (RQ1). Second, passages linking BPM phases to DAT tools and DAT tools to performance outcomes were read to examine the roles participants assigned to BI, AI and AA (RQ2). Comparisons across higher education and logistics participants (RQ3) were made.

A connection among a BPM phase, a DAT tool and a performance outcome was reported as a pathway only when a single participant described that sequence within one coherent account. Where these elements appeared in separate passages, they are reported as thematic connections rather than sequences. The findings are not evaluated on a rating scale but instead summarized into interpretive tables that outline each theme, its organizational context, an illustrative quote and a contrasting account, if any.

Interpretive Credibility

The credibility of the interpretations was supported by retaining divergent accounts alongside supportive ones, comparing accounts within and across the two sectors and reading coded passages in their surrounding interview context rather than as isolated fragments (Braun & Clarke, 2021).



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Results

Characterization of Business Process Performance (BPP) Dimensions

Thematic analysis of the transcribed interview data resulted in six dimensions namely: Decision Making, Customer Services, Efficiency, Marketing, Accuracy and Timeliness that participants consider in judging Business Process Performance (Van Looy & Shafagatova, 2016). Participants described how DAT used within BPM workflows supported their work on each of these dimensions, although some dimensions were discussed in more depth than others. The qualitative sub-components, thematic interpretations and representative participant quotes are summarized in Table 1.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Table 1. Thematic Analysis and Representative Quotes for Business Process Performance Dimensions

BPP Dimension	Thematic Interpretation	Representative Participant Quotes
Decision Making	Operational and managerial utilization of process-level data and analytical outputs to resolve queries, optimize workflow timing and target resource allocation.	*"So, complete contrast in managing, timing, resolution of queries and then the decision making as well. Because if you delay invoices to your customers, they often don't remember what happened on day minus six or day minus 10, so the query will take more time."* (P1) *"All of them operate on the same granularity of data just about. They need underlying atomic information to create these three structures and it depends on the focus of the decision maker or action taker; changes the way those analytics look."* (P3)
Customer Services	Enhancements in query resolution speed, communication transparency and service tracking facilitated by integrated reporting dashboards.	*"We run the log and if there's a query with the customer, we'll pick it up and we'll resolve the query."* (P5) *"This initiation of the Tableau reports and all of that configuration, they would just get an email notification at nine o'clock with a summary and then they can click on the link and slice and dice and see which of the plans are popular, what kind of services are the users using most and all of that to improve customer services."* (P4)
Efficiency	Shorter cycle times, fewer redundant steps and better use of resources, which participants linked to workflow automation. Shorter cycle times, fewer redundant steps and better use of resources, which participants linked to workflow automation.	*"We revamp the business processes to increase the efficiency of the business processes, product activity and reduce the cyclic time."* (P7)
Marketing	Optimization of recruitment channels, agent tracking and customer engagement campaigns using data-driven performance monitoring.	*"I monitor the performance of educational agents or consultants and I can see if they are going up and down, what they are recruiting to, et cetera, as well, what their individual conversion rates are."* (P8)

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BPP Dimension	Thematic Interpretation	Representative Participant Quotes
Accuracy	Data integrity, reliable reporting and forecasting, and fewer errors in workflow execution.	*"Accurate reporting and forecasting based on quicker access to the data."* (P10) *"The accuracy of data, the most important and the historical patterns. From there you can get the idea."* (P4)
Timeliness	Real-time reporting, rapid service delivery and minimized operational delays supported by automated alerts and tracking systems.	*"We now run report on a daily basis. We now analyse daily... we were doing it in four days, five days late. And in the new contract or the Argos contract, two different customers, here, we're doing it on a real-time basis."* (P6)

BPM Lifecycle Phases in Participants' Accounts (RQ1)

Participants did not describe the six lifecycle phases as equally present in their work. Three themes capture how they talked about the phases in relation to performance.

Process visibility and clarity

The phases where participants described their processes becoming visible were identification, discovery and analysis. Accounts of identification emphasized the need for agreement on what a process entailed, who had responsibility for it, where it terminated and linking these aspects of clarity to better records and better service. The discussion of discovery was primarily with respect to mapping and how it revealed errors and duplications. Analysis accounts focused on locating delays. A logistics participant identified a slow customer enquiry as a late invoicing problem: *"...if you delay invoices to your customers, they often don't remember what happened on day minus six or day minus 10, so the query will take more time." (P1)*

The participant read a customer-service problem as a timing problem located earlier in the process, and analysis was where that connection became apparent. P3 described visibility from the data side, explaining that different analytical views draw on the same data and change shape with the focus of the decision maker. *"That's part of what we're trying to get at here, is that does this whole setup number one lead to inefficient business processes continuing, because there's nobody to identify that whole business process has got too many steps in it". "Of course, you need to look at the data and the process and map it out and go, "Yeah, could this be better".* We interpret these accounts as suggesting that participants valued the early phases less as formal steps than as the moments when everyday work became legible enough to act on (Zuhaira & Ahmad, 2021).

Monitoring as a routine for sustaining performance

Monitoring and controlling were defined as a routine, not as a routine review and were related to timely reporting and decision making. One participant compared the previous system with the current system: *"We now run report on a daily basis. We now analyse daily... we were doing it in four days, five days late... here, we're doing it on a real-time basis." (P6)*. Another described monitoring as the starting point for service recovery: *"We run the log and if there's a query with the customer, we'll pick it up and we'll resolve the query" (P5)*. Even where monitoring remained manual, participants seemed to see it as the point at which earlier improvements could be seen and corrected (Zur Mühlen & Shapiro, 2010).

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Translating redesign into implementation

The terms reengineering and implementation were used differently. Participants described redesign as purposeful, for example revamping business processes *"to increase the efficiency... and reduce the cyclic time" (P7)*. Reports of implementation, on the other contrast, highlighted problems with staff resistance, inter-unit coordination, and getting redesigned processes into front-line work. *"Before the implementation of Tableau in their department, they had to do a lot of manual processing just to see what kind of sales they did last night or yesterday". "So, we are hoping that will change for the implementation of ERP, which is a big proxy ambitious project that the university is currently working on".* Participants appeared to see the gap between redesign and everyday practice as an organizational rather than a technical difficulty, a pattern also reported in BPM change projects in educational settings (Souza et al., 2022; Szelągowski & Berniak-Woźny, 2024). Interpretive synthesis of BPM lifecycle themes is shown in Table 2.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Table 2. Interpretive Synthesis of BPM Lifecycle Themes

Interpretive theme	Participants' accounts	Organizational context	Illustrative quotation	Variation or contrasting account	Qualitative interpretation
Process visibility and clarity	Identification, discovery and analysis described as the points where boundaries, owners and delays became visible	Invoicing and query handling in logistics; analytical reporting in both sectors	*"... if you delay invoices to your customers... the query will take more time..."* (P1)	*"Logistics and Supply Chain Department-Managing overall organisation's Logistics and SCM operations)."* (P1)	Early phases valued for making every day work legible enough to act on
Monitoring as a sustaining routine	Monitoring described as a daily routine linked with timely reporting, decisions and query resolution	Daily and real-time reporting; customer query logs	*"...purpose of making decisions within the department, it is of the utmost importance to verify and view the current state of the application in real time..."* (P12)	*"Academia Administration and Forecasting Department-Managing overall students' enrolment and furcating operations"* (P12)	Monitoring understood as keeping improvements visible and open to correction
Translating redesign into implementation	Redesign described as purposeful; implementation accounts emphasized resistance and coordination	Administrative redesign in higher education; front-line rollout in both sectors	*"... we revamp the business processes to... reduce the cyclic time..."* (P7)	*"Data Analyst -Managing organisation's SCM data)."* (P7)	The gap between redesign and practice understood as organizational rather than technical

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Roles Attributed to Data Analysis Technology (RQ2)

Consistent with the functional definitions used in coding, participants differentiated the three DAT categories by what each did in their work. Two themes describe these roles, followed by the connections participants drew among phases, tools and outcomes.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Analytical tools supporting managerial sensemaking

BI was described through dashboards and scheduled reports that condensed operational data into a form managers could scan and question. P4 described a routine in which users *"would just get an email notification at nine o'clock with a summary"* and could then explore which plans and services were used most. A higher education participant linked increased data access to *"accurate reporting and forecasting"* (P10). Advanced analytics was mentioned primarily in the context of forecasting and decision support, and participants said it was less integrated into their daily work than BI or AI. Viewed through CPT, these accounts suggest that BI was valued more for its ability to narrow the data down to something actionable than for the sheer amount of data it provides (Gigerenzer, 1991; Theodorakopoulos et al., 2025).

Automation and monitoring in everyday process work

AI was primarily discussed with respect to reengineering and monitoring. Participants reported employing AI to simulate workflows, allocate resources and flag anomalies, and related automated alerts to intervention occurring earlier before delays reached consumers. The accounts suggest that participants saw AI more as a component of monitoring practice than as a technology in its own right (Tsoury et al., 2020; Zong & Guan, 2025).

Thematic Connections among BPM, DAT and BPP

Three connections recurred in the narratives. Participants shared ideas about reengineering, AI-assisted simulation, and resource allocation, and they viewed faster processes as a desired outcome. They talked about monitoring with AI and BI tools and linked it to timeliness, marketing, and efficiency. They discussed using advanced analytics primarily to support management decisions. Because these elements typically appeared in separate interview passages, they are reported as thematic connections and not as sequential pathways. P1 (Logistics and Supply Chain Department-Managing overall organisation's Logistics and SCM operations) *"... I need to check that from the department. There's a lot of information on it. And obviously, we work with our customers, and some of our business processes change with the customers. So, we don't have a one-stop shop at the moment, but if I have the ability, then I'll..."*. Table 3 synthesizes the roles participants attributed to each DAT category.

Sector Comparison (RQ3)

In order to make it easier to analyse the interviews, three of the participants (P4, P11 and P12) had experience of working with DAT in both sectors so these were analysed with the others and sector differences are reported qualitatively instead of separately by number. Participants in the two sectors described DAT in different organizational contexts. Higher education participants explained that DAT was used primarily in admissions, recruitment and enrolment forecasting for conversion monitoring and planning purposes with the dashboard and workflow tools helping to achieve *"accurate reporting and forecasting based on quicker access to the data"* (P10). Process change in this sector was directed towards re-engineering administrative processes to *"reduce the cyclic time"* (P7). Logistics participants who

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discussed invoicing and warehouse activities, and query resolution and real-time reporting, had immediate consequences for their customers when things were delayed that is *"if you delay invoices to your customers, they often don't remember what happened... so the query will take more time"* (P1). In both sectors, however, participants associated well-defined and monitored processes with more timely and accurate work. The accounts are therefore presented together, with sector differences noted where participants described them.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Table 3. Interpretive Synthesis of DAT Roles

Interpretive theme	Participants' accounts	Organizational context	Illustrative quotation	Variation or contrasting account	Qualitative interpretation
BI: condensing data for sensemaking	Dashboards and scheduled reports summarized operational data for quick review	Service-usage reporting; recruitment reporting and forecasting	*"... they would just get an email notification at nine o'clock with a summary..."* (P3)	*"Power BI where users can filter and explore the data to identify trends, monitor progress and support decision-making".* (P3)	BI valued for reducing information to an actionable form
AI: automation within monitoring and redesign	AI used in redesign and monitoring for simulation, resource allocation and alerts	Process redesign and real-time monitoring	*"... when people are like artificial intelligence and they're real time and all these things, it's like wonderful technology and yeah, they have a lot of promise..."* (P8)	*"In-house developed Chatbots to save staff time and make services more accessible".* (P8)	AI understood as part of the monitoring routine rather than a separate tool
AA: decision support with limited embedding	Forecasting and scenario modelling discussed mainly for decisions	Planning and forecasting	*"...the business processes, activities, and workflows aim to enhance productivity, shorten cycle times, and elevate quality. An organization can utilize data in real time for business processes, including planning, forecasting, and decision-making in advance analysis..."* (P9)	*"It is important but not used in routine business processes."* (P9)	Predictive and prescriptive modelling available for decisions but not yet routine

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Discussion

This study aimed to gain insight into how participants understand the relationships between the phases of the BPM lifecycle and BPP, and the function they assign to DAT in these relationships. Participants described identification, analysis, and monitoring and controlling as the phases where processes became visible and available for measurement, and they linked these phases to accuracy and timeliness. In lifecycle studies where process definition and monitoring are used as the basis for continuous improvement, similar results are reported (Scavarda et al., 2025; Zuhaira & Ahmad, 2021). This interpretation is also in line with Aydiner et al. (2019) who concluded that business analytics is related to firm performance via process performance.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

Implementation accounts, however, emphasized resistance and coordination difficulties. The warnings of similar change management risks in BPM projects in an educational context are reported by Souza et al. (2022) and (Szelągowski & Berniak-Woźny, 2024) present some similar restrictions in BPM in general. Overall, participants linked AI and BI primarily to reengineering and monitoring and controlling and associated these tools with faster processes. According to their accounts, BPM offered a basis for process control and DAT added automation and predictive capability (Distel et al., 2023), enabling problems to be identified beforehand and not after the event (Márquez-Chamorro et al., 2017). This perspective aligns with research linking BI use to organizational performance (Suša Vugec et al., 2020).

Advanced analytics occupied a different place. It was discussed primarily in terms of decision support, indicating that predictive and prescriptive modelling were not yet part of routine process work in these organizations. The processes discussed varied between the two sectors but the participants in each gave broadly similar accounts. Higher education participants discussed admissions, recruitment, and forecasting, while logistics participants discussed invoicing, resolving queries, and real-time reporting.

Theoretical Implications

The findings extend the use of RBV and CPT in BPM research. In terms of RBV, participants did not report identifying BPM or DAT as a source of advantage on their own; they reported that the combination of BPM and DAT provided value that the structure of the process provided value for the analytics tools and that the analytics tools provided value for the process structure (Iden et al., 2025; Sakr et al., 2018). This resonates with the notion of BPM capability and DAT resources as complementary packages (Bernardo et al., 2017; Wong et al., 2014). An interview design is not suited to judging whether such bundles are rare or inimitable; participants viewed these combinations as organization specific and not easy to put together which is a necessary not sufficient condition for sustained advantage. In terms of a CPT, participants noted that dashboards, alerts and automated reports were tools that condensed large volumes of data into a form they could act on quickly. This is similar to seeing DAT as an external support to managerial judgment (Gigerenzer, 1991; Theodorakopoulos et al., 2025) although cognitive load was not examined directly. Read together, RBV helps interpret why participants regarded the BPM and DAT bundle as worth building, and CPT helps interpret how they saw it as supporting process-level decisions.

Practical Implications

The research has practical implications for the business community on how to effectively adopt BPM that integrates DAT. The participants' experiences indicate that BPM alone may not keep up with a rapidly changing business world and that with the help of DAT organizations can

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enhance their processes. The study suggests that BPM needs to evolve from process-oriented and static to data-oriented and dynamic, where tools like business intelligence (BI), artificial intelligence (AI) and predictive analytics are used for making decisions and improving processes (Tripathi et al., 2021). An implication is that organisations could gain advantage from using BPM to include real-time reporting and predictive analytics to help make data-informed decisions. This can help businesses detect inefficiency and waste and to make quicker and better decisions. The study also suggests the need for ongoing monitoring and controlling that can be achieved with DAT allowing timely notifications and reports to ensure ongoing improvement. The benefits that participants reported are primarily related to the timeliness and accuracy, making analytics-driven BPM also beneficial for the operational part of business sustainability with the potential to reduce rework, delays and resource waste.

Volume: 2, Issue: 2, 2026

Priorities are also influenced by the context of the sector. The higher education sector is more likely to benefit from mapping and standardizing processes in relation to recruitment and enrolment forecasting as well as admissions, while also connecting processes to shared dashboards in the context of DAT's use in higher education. In logistics, where invoicing, query resolution and real-time reporting are all prime concerns, businesses can take predictive analytics and automation one step further to reduce delays. The following suggestions are illustrative and must be taken in the context of the two contexts from which they are taken.

Limitations and Future Directions

The findings were limited in their application and transferability. First, the accounts are drawn from two organizational environments: a public university and a commercial courier company; BPM and DAT practices might be interpreted differently in other sectors and in other organizations of different size. Second, the results are based on self-reported accounts of what participants recalled and how they made sense of their work. Third, there was no evidence from the cross-sectional design of how these practices change over time. Fourth, the deductive structure of sensitizing concepts might have drawn attention to the phases, the tools and the dimensions of performance they included, while shifting focus away from meanings they did not include. We consider the number of participants sufficient based on information power (Malterud et al., 2016) and the main limitation is not the number of participants, but the contextual scope of the accounts. The interpretations are thus best transferred to similar settings.

Qualitative research in the future could explore other organizational contexts, look at BPM and DAT practices over time and use interviews alongside observation and organizational documents. The contribution of culture and leadership to integrating DAT with BPM should not be neglected. This study did not consider sustainability outcomes and future research should look at the relationship between analytics-driven BPM and environmental and social sustainability.

Conclusion

The objective of this study was to gain insight into the practitioners' interpretation of the relationships between BPM, DAT and BPP. A group of 12 higher education and logistics experts were interviewed. Their accounts suggest that identification, analysis and monitoring were the stages where processes became apparent and open to correction, and participants linked these stages with accurate and timely work. Accounts of implementation, by contrast, emphasized resistance and coordination difficulties. Participants referred to the use of AI and BI as part of redesign and monitoring processes which helped in reporting, automation and timely responses while advanced analytics was discussed mainly as support for decisions.

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The meanings were similar between the two sectors, but the processes involved varied. In higher education, participants described DAT mainly in relation to admissions, recruitment and forecasting, whereas in logistics they described it mainly in relation to invoicing, query resolution and real-time reporting.

Theoretically, the study shows how RBV and CPT can be used together as interpretive lenses. RBV helps explain why participants valued BPM and DAT as a bundle, and CPT helps explain how they saw that bundle as supporting process decisions. Organizations can, in practice, leverage their redesign and monitoring processes to incorporate BI and AI, prepare for overcoming implementation challenges before expanding analytics, and consider growing predictive capability over time. These actions may help reduce delay, rework and waste, contributing to the operational aspect of business sustainability, though sustainability impact needs to be looked at separately.

International Journal of Business Sustainability

Volume: 2, Issue: 2, 2026

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Declarations

Author Contributions (CRediT)

Haroon Bhutta: Conceptualization, Methodology, Project Administration, Data Curation, Formal Analysis, Visualization, and Writing-original draft. Selena Firmin: Supervision, Validation, Writing-review. Taiwo Oseni: Supervision, Validation, Writing-review. Andrew Stranieri: Supervision, Validation, Writing-review.

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Conflict of Interest

The authors declare that they have no competing interests.

Data Availability Statement

The data are not publicly available due to participant confidentiality and ethical restrictions.

Ethics Approval and Informed Consent

This study was approved by the Federation University Human Research Ethics Committee (Reference Number: B20-015). Informed consent was obtained from all participants.

Declaration of Generative AI Use

Not applicable.

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Appendices A. Coding Audit Trail

The following records were produced by NVivo matrix queries and are retained for transparency. They show where participants' accounts touched on combinations of concepts. Counts reflect how often a combination was discussed, which is shaped by the interview guide and by interview length. They are not evidence of the importance of any phase, tool or outcome, or of the strength of any connection.

Table A1. Coded References by BPM Lifecycle Phase

BPM Lifecycle Phase	Unique passages	Cell intersections
Identification	43	45
Discovery	24	30
Analysis	37	47
Reengineering	18	22
Implementation	17	19
Monitoring & Controlling	31	41
All phases	**163[a]**	**204**

Note. Unique passages = passages coded to the phase and to at least one BPP dimension. Cell intersections = row totals of Table 3. [a] The phase-level unique counts sum to 170 because some passages were coded to more than one phase, 163 is the number of distinct passages.

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Table A2. *Matrix of BPM Lifecycle Phases and BPP Dimensions (Cell Intersections)*

BPM Lifecycle Phase	Accuracy	Customer Services	Decision Making	Efficiency	Marketing	Timeliness	Total Row References
Identification	15	13	1	0	4	12	45
Discovery	13	4	0	4	3	6	30
Analysis	9	7	0	8	4	19	47
Reengineering	6	3	0	2	0	11	22
Implementation	3	8	1	0	2	5	19
Monitoring & Controlling	7	7	9	2	6	10	41
Total	**53**	**42**	**11**	**16**	**19**	**63**	**204**

Note. Cells show the number of passages coded to both the phase and the dimension. Totals are sums of cells. Because a passage could be coded to more than one dimension, the 204 intersections come from 163 unique passages.

Table A3. *BPM Lifecycle Phases and DAT Categories (Cell Intersections)*

BPM Lifecycle Phase	Advanced Analytics (AA)	Artificial Intelligence (AI)	Business Intelligence (BI)	Total
Analysis	2	3	1	6
Discovery	2	7	1	10
Identification	3	3	1	7
Implementation	0	8	4	12
Monitoring & Controlling	3	18	10	31
Reengineering	3	22	5	30
Total	**13**	**61**	**22**	**96**

Note. Cells show the number of passages coded to both the phase and the DAT category. Totals are sums of cells. Because a passage could be coded to more than one category, the 96 intersections come from 70 unique passages

Table A4. *DAT Categories and BPP Dimensions (Cell Intersections)*

DAT Dimension Code	Accuracy	Customer Services	Decision Making	Efficiency	Marketing	Timeliness	Total Row References
Business Intelligence	10	6	8	1	7	31	**63**
Artificial Intelligence	6	7	7	9	13	34	**76**
Advanced Analytics	3	2	11	0	11	12	**39**
Total	**19**	**15**	**26**	**10**	**31**	**77**	**178**

Note. Cells show the number of passages coded to both the DAT category and the BPP dimension. Totals are sums of cells. Because a passage could be coded to more than one category or dimension, the 178 intersections come from 133 unique passages.

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