

From Data Chaos to Decision Clarity: How Information Governance and Integration Shape Information Use in SME Inventory Decisions

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DOI Link: <http://dx.doi.org/10.6007/IJARBSS/v16-i10/29195>

Published Date: 24 October 2026

Abstract

This study examines how information governance (IG) and data integration capability (DIC) relate to decision information use (DIU) through information quality (IQ) among small and medium-sized enterprises (SMEs) in Selangor, Malaysia. Drawing on Organisational Information Processing Theory, the research distinguishes arrangements for managing and reconciling inventory records from their perceived quality and subsequent use in replenishment decisions. Survey responses from 360 SME participants, recruited through purposive sampling in October 2026, were analysed using four-item construct composites, measurement diagnostics and standardised ordinary least squares regressions with 2,000-resample percentile bootstrap intervals. IG ($\beta = 0.344$) and DIC ($\beta = 0.335$) were positively associated with IQ, explaining 29.6% of its variation. IQ was associated with DIU ($\beta = 0.451$; $R^2 = 0.204$). The respective product-of-coefficients indirect associations were 0.155 and 0.151, with confidence intervals excluding zero. The findings support a decision-specific statistical linkage among information arrangements, perceived quality and reported use, without establishing causal mediation or objective improvements in inventory performance.

Keywords: Information Governance, Data Integration Capability, Information Quality, Decision Information Use, Sme Inventory Replenishment

Introduction

Inventory replenishment entails selecting order quantities and timing while reconciling demand, stock balances, purchasing histories and supplier lead times. For smaller firms, these decisions are complicated by fragmented transactional records and uneven access to analytical resources. Teerasoponpong and Sopadang (2022) show the importance of targeted inventory and sourcing decision support for SMEs, while Jonsson and Myrelid (2016) distinguish access to shared supply-chain information from its actual utilisation. Together, these studies suggest that recording information and using it are separate managerial accomplishments.

Information governance concerns who is responsible for maintaining, approving and safeguarding data, whereas integration concerns whether information from multiple systems can be meaningfully combined (Khatri & Brown, 2010; Goel et al., 2024). Even when these arrangements exist, decision-makers must judge whether information is accurate, timely and fit for purpose (DeLone & McLean, 2003; Wang & Strong, 1996). Lem (2024) links analytics strategy with internal information quality, while Hautala-Kankaanpää (2023) identifies complementarity between SME data capability and supply-chain capability. These adjacent results motivate, but do not directly prove, the inventory-specific pathway investigated here. The Malaysian SME context also features research on the management of decision-support information in other functional domains. Nordin et al. (2025) propose structured components for evaluating paid digital advertising performance among Malaysian SMEs. Although that article does not investigate inventory replenishment, it provides a relevant contextual example of the need to structure information for management evaluation. The current study addresses the distinct operational setting of replenishment records and decisions.

The present article isolates the upstream portion of the information-to-decision process: information governance (IG) and data integration capability (DIC) are examined as concurrent antecedents of information quality (IQ), and IQ is examined as a predictor of decision information use (DIU). Specifically, the study has three objectives:

To examine the joint associations of IG and DIC with IQ among SME inventory replenishment decision-makers.

To assess the association between IQ and reported DIU in replenishment decisions.

To estimate the specific indirect associations of IG and DIC with DIU through IQ, without inferring causal mediation from cross-sectional data.

The contribution lies in estimating differentiated information-processing stages within SME inventory replenishment, rather than treating broad digital capability as a single explanatory factor.

Literature Review and Hypothesis Development

Organisational information-processing perspective

Organisational Information Processing Theory (OIPT) holds that organisations need information-processing arrangements suited to task uncertainty and coordination demands (Galbraith, 1974). Replenishment choices draw on sales, warehouse, purchasing and supplier records that may differ in timing, ownership and completeness. Governance allocates authority for records, integration provides cross-source visibility, IQ reflects the decision-relevant properties of the resulting information, and DIU represents the reported application of information in an ordering choice. This progression is theoretically consistent with the distinction between information sharing, quality and utilisation in supply-chain planning (Jonsson & Myreliid, 2016). It is proposed as an associational framework, not a proven chronological sequence.

Information governance and information quality

Information governance (IG) concerns policies, stewardship roles, decision rights and controls that define how data are created, maintained and used. Khatri and Brown (2010) identify explicit governance decisions as part of treating organisational data as an asset. Goel et al. (2024) likewise formulate governance principles for dependable process-related data, although their empirical setting is process mining rather than SME inventories. In

replenishment, clear ownership of stock records and procedures for correcting discrepancies may support more accurate and timely information. The applicability of this mechanism to the focal setting is therefore assessed empirically rather than presumed from the cited studies.

H1: Information governance is positively associated with information quality.

Data integration capability and information quality

Data integration capability (DIC) is the reported organisational ability to combine and reconcile information across sales, purchasing, supplier and inventory sources. Hautala-Kankaanpää (2023) finds that data capability and supply-chain capability work together in explaining operational performance among manufacturing SMEs. In a broader meta-analysis, Raj et al. (2025) describe the roles of analytics and supply-chain capabilities in operational outcomes. Neither study directly estimates the present DIC–IQ relationship. However, integration may reduce discrepancies and retrieval effort, potentially increasing information fitness for replenishment choices; conversely, integrating poor-quality sources may amplify errors. This makes the direction and size of the relationship an empirical question.

H2: Data integration capability is positively associated with information quality.

Information quality and decision information use

Information quality (IQ) encompasses perceived accuracy, completeness, relevance and timeliness. Wang and Strong (1996) established that data quality is multidimensional and depends on users' purposes. DeLone and McLean (2003) distinguish information quality from system usage and outcomes in information-systems success research. Jonsson and Myrelid (2016) further identify information quality and intended usage among the antecedents of actual supply-chain information utilisation. Accordingly, even well-integrated data may not affect a replenishment decision unless personnel consult and apply it. This study therefore treats DIU as behaviourally distinct from IQ.

H3: Information quality is positively associated with decision information use.

Indirect relationships through information quality

If governance and integration are associated with IQ, and IQ is associated with DIU, positive products of the corresponding regression paths are possible. The indirect pathway is a useful statistical decomposition, but cross-sectional products do not establish temporal or causal mediation (Maxwell & Cole, 2007). The focus here is deliberately narrow: the direct IG-to-DIU and DIC-to-DIU paths are not estimated in the specified outcome equation. Therefore, the reported products are described as indirect associations, not evidence of complete mediation.

H4a: Information governance has a positive indirect association with decision information use through information quality.

H4b: Data integration capability has a positive indirect association with decision information use through information quality.

Figure 1 depicts the study's focused information-processing model. The two upstream constructs are linked to information quality, which is linked to decision information use. The path annotations show the reported standardised regression coefficients, while the note summarises the two product-of-coefficients indirect associations.

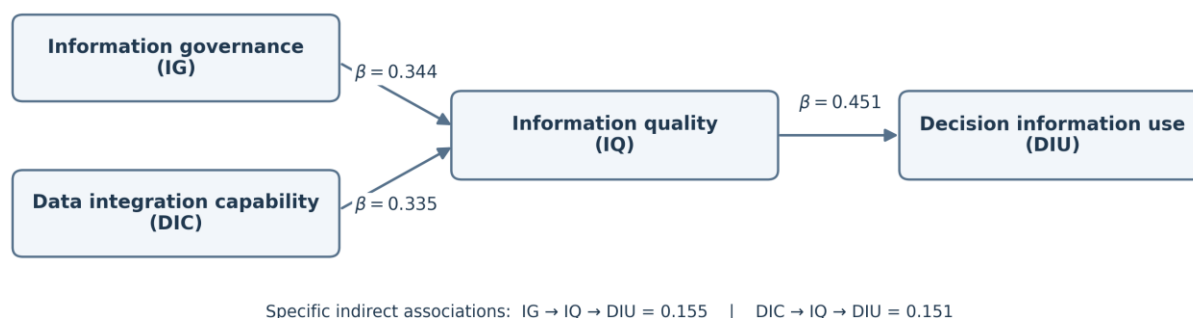


Figure 1. Focused information-processing framework and standardised path estimates.

Research Methodology

Research design and sampling

The study examined SME inventory replenishment decision-making in Selangor, Malaysia, using a cross-sectional survey and purposive sampling. A total of 360 respondent records were collected in October 2026. The unit of analysis was an individual respondent's reported information-management and replenishment practices, not an independently logged inventory transaction. As purposive sampling is a non-probability approach, the findings should be interpreted for the analysed respondents rather than generalised probabilistically to all Malaysian SMEs. Cross-sectional data also limit temporal and causal inference (Maxwell & Cole, 2007).

Operationalisation and measurement

The analysis covered IG, DIC, IQ and DIU, each represented by four five-point questionnaire items. Unweighted item means served as composite scores. IG concerns inventory-data accountability and controls; DIC concerns reconciliation across records; IQ concerns information accuracy, completeness, relevance and timeliness; and DIU concerns the reported consultation and use of information during replenishment. The conceptual distinction between the latter two is supported by Wang and Strong (1996), DeLone and McLean (2003), and Jonsson and Myrelid (2016). Table 1 presents the measurement domains.

Table 1

Operationalisation of study constructs

Construct	Operational domain	Items
Information governance (IG)	Accountability, stewardship, procedures and controls for inventory records	4
Data integration capability (DIC)	Access, combination and reconciliation of replenishment-relevant records	4
Information quality (IQ)	Accuracy, completeness, relevance and timeliness of decision information	4
Decision information use (DIU)	Consultation and application of records in replenishment decisions	4

Source: Study construct definitions and questionnaire operationalisation.

The distinctions in Table 1 enable governance and integration to be assessed as antecedents rather than treated as alternative labels for information quality. Likewise, DIU reflects reported application of information, not merely its availability.

Measurement assessment

The measurement assessment comprised Cronbach's alpha, separate one-factor maximum-likelihood estimates of composite reliability (CR) and average variance extracted (AVE), and exploratory heterotrait–monotrait ratios (HTMT). These are different diagnostics: alpha summarises item consistency but cannot establish unidimensionality (Sijtsma, 2009), while the HTMT criterion was developed for discriminant validity assessment in variance-based structural equation modelling (Henseler et al., 2015). The reported factor-derived CR and AVE values are treated as preliminary measurement evidence, not as results from a jointly estimated confirmatory measurement model.

Statistical specification

The analysis employed IBM SPSS Statistics and standardised composite-score ordinary least squares (OLS) regression. In the information-quality equation, both antecedents entered simultaneously; in the decision-information-use equation, information quality was the sole predictor:

$$\begin{aligned} \text{IQ} &= \alpha_0 + a_1(\text{IG}) + a_2(\text{DIC}) + \varepsilon_1 \\ \text{DIU} &= \beta_0 + b(\text{IQ}) + \varepsilon_2 \end{aligned}$$

The two product-of-coefficients indirect associations were calculated as a_1b and a_2b . As reported in the study analysis, 95% percentile confidence intervals were based on 2,000 resamples. These are regression estimates on composite scores, not latent-variable PLS-SEM paths. Percentile bootstrap inference is one accepted procedure for indirect-effect testing (Hayes & Scharkow, 2013). Because the DIU equation omits the direct antecedent-to-use paths, the coefficients do not identify complete or partial mediation. The indirect relationships are therefore described as statistical associations rather than causal pathways (Maxwell & Cole, 2007).

Results

Descriptive properties

Table 2 reports the mean, standard deviation and skewness of the four composite scores. All means are slightly above the midpoint of the five-point response range, and the reported skewness values are comparatively small.

Table 2

Descriptive statistics for composite scores (n = 360)

Construct	Mean	SD	Skewness
IG	3.082	0.772	-0.216
DIC	3.087	0.698	-0.164
IQ	3.088	0.735	0.032
DIU	3.075	0.756	-0.006

Source: Authors' analysis of SME survey responses (n = 360).

The descriptive results indicate broadly similar average responses across governance, integration, quality and information use. Descriptive proximity does not establish that the constructs measure the same phenomenon.

Reliability and preliminary convergent validity

Table 3 presents internal consistency and one-factor measurement diagnostics. Cronbach's alpha ranges from 0.793 to 0.841; the corresponding reported CR and AVE values provide complementary but preliminary evidence about item coherence.

Table 3

Preliminary measurement properties

Construct	Items	Cronbach's α	CR (one-factor ML)	AVE (one-factor ML)
IG	4	0.831	0.834	0.562
DIC	4	0.793	0.798	0.502
IQ	4	0.841	0.845	0.578
DIU	4	0.825	0.827	0.546

Source: Authors' analysis of SME survey responses (n = 360).

The reported alpha and CR values exceed 0.70 and the AVE estimates exceed 0.50, but these thresholds alone do not establish comprehensive construct validity. Because IG and DIC had comparatively weaker item loadings in the source analysis, further item-level assessment and confirmatory testing would strengthen measurement claims (Sijtsma, 2009; Henseler et al., 2015).

Construct correlations and discriminant assessment

Table 4 reports Pearson correlations among the composite scores. The largest displayed associations are between IG and IQ ($r = 0.440$), DIC and IQ ($r = 0.433$), and IQ and DIU ($r =$

0.451), consistent with the proposed ordering of information arrangements, information quality and use.

Table 4

Pearson correlations among composite scores

Construct	IG	DIC	IQ	DIU
IG	1.000	—	—	—
DIC	0.285	1.000	—	—
IQ	0.440	0.433	1.000	—
DIU	0.220	0.260	0.451	1.000

Source: Authors' analysis of SME survey responses (n = 360).

The correlations are positive but do not suggest that the four composites are interchangeable. In particular, IQ is more strongly associated with DIU than IG or DIC are in simple bivariate comparisons.

Table 5 provides exploratory HTMT point estimates for each construct pair. These values help screen whether the measured domains are sufficiently distinct, but should not be treated as a substitute for a comprehensive assessment of the measurement model (Henseler et al., 2015).

Table 5

Exploratory HTMT point estimates

Construct pair	HTMT
DIC–IG	0.351
DIU–DIC	0.322
DIU–IG	0.265
DIU–IQ	0.542
IQ–DIC	0.530
IQ–IG	0.527

Source: Authors' analysis of SME survey responses (n = 360).

The HTMT estimates range from 0.265 to 0.542. None suggests extreme pairwise overlap by common descriptive screening conventions, although interval-based inference and joint factor-model assessment would be stronger evidence of discriminant validity.

Regression relationships

Table 6 summarises the three reported structural paths and their percentile bootstrap intervals. IG and DIC were entered jointly in the IQ regression; IQ was then entered in the DIU regression. The table also reports the hypotheses associated with each path.

Table 6. Standardised direct relationships

Hypothesis	Path	β	95% bootstrap CI
H1	IG $\rightarrow$ IQ	0.344	[0.250, 0.434]
H2	DIC $\rightarrow$ IQ	0.335	[0.238, 0.428]
H3	IQ $\rightarrow$ DIU	0.451	[0.363, 0.540]

Source: Authors' analysis of SME survey responses (n = 360).

Both antecedents were positively associated with IQ: IG ($\beta = 0.344$) and DIC ($\beta = 0.335$). The antecedent model accounted for 29.6% of IQ composite variance ($R^2 = 0.296$). IQ was positively associated with DIU ($\beta = 0.451$), explaining 20.4% of DIU composite variance ($R^2 = 0.204$). The three reported bootstrap intervals exclude zero, supporting H1–H3 as statistical association hypotheses within the fitted specification.

Specific indirect associations

Table 7 presents the two specific indirect associations obtained by multiplying each IG or DIC pathway into IQ by the IQ-to-DIU pathway. The percentile bootstrap intervals quantify uncertainty around these products without establishing the chronological ordering of the underlying constructs.

Table 7

Specific product-of-coefficients indirect associations

Hypothesis	Indirect pathway	Estimate	95% bootstrap CI
H4a	IG $\rightarrow$ IQ $\rightarrow$ DIU	0.155	[0.108, 0.205]
H4b	DIC $\rightarrow$ IQ $\rightarrow$ DIU	0.151	[0.099, 0.213]

Source: Authors' analysis of SME survey responses (n = 360).

The indirect estimates were positive for both IG (0.155) and DIC (0.151), and their reported percentile confidence intervals excluded zero. H4a and H4b are therefore supported as specified indirect-association hypotheses. Because direct IG-to-DIU and DIC-to-DIU relationships were not included in the DIU equation, these findings should not be presented as evidence that information quality completely mediates either relationship (Maxwell & Cole, 2007).

Discussion

The findings distinguish two upstream conditions for using information in replenishment: governance and integration are each positively associated with the perceived quality of information, and quality is positively associated with the reported use of that information. This pattern fits OIPT's proposition that organisational arrangements should match information-processing requirements (Galbraith, 1974). It also aligns with the separation of data governance responsibilities from data consumption (Khatri & Brown, 2010), although the empirical design does not isolate the effect of introducing particular governance procedures. The similar magnitudes of the IG–IQ and DIC–IQ coefficients suggest that stewardship arrangements and cross-system reconciliation can be treated as distinct, complementary management concerns rather than substitutes. Goel et al. (2024) document governance challenges in the neighbouring context of process mining, while Hautala-Kankaanpää (2023) finds that data and supply-chain capabilities jointly matter for SMEs. These studies support

the plausibility of a multistage information-processing explanation without directly testing the pathways in the present model.

The IQ–DIU association is particularly relevant to information-systems research. Wang and Strong (1996) explain why quality must reflect fitness for information consumers; DeLone and McLean (2003) distinguish information quality and use; and Jonsson and Myrelid (2016) show that shared supply-chain information must be actually utilised in planning. The present results extend this distinction to respondents' inventory-replenishment reports. They do not demonstrate that greater information use reduces stockouts or improves objective ordering accuracy.

Theoretical contribution and boundaries

The principal theoretical contribution is the narrower specification of an upstream mechanism: IG and DIC are related to perceived IQ, which in turn relates to DIU. This differs from a generic assertion that digitalisation improves business outcomes. Raj et al. (2025) examine analytics and supply-chain capabilities at the performance level; Lem (2024) examines analytics strategy and internal information quality; and Jonsson and Myrelid (2016) focus on information utilisation in supply-chain planning. The present study draws these strands together at the inventory-decision level without claiming that information-use theory is novel.

There are reasonable competing interpretations. Well-organised firms may simultaneously adopt governance practices, integrate systems and encourage employees to consult records. Alternatively, managers who report favourable information-use practices may also assign favourable ratings to quality and governance. Common-source questionnaires can inflate relationships through shared response tendencies (Podsakoff et al., 2003), and cross-sectional indirect products need not represent longitudinal mediation (Maxwell & Cole, 2007). A stronger future design would add temporal separation, multiple respondents and independently recorded replenishment events.

Managerial implications

For SME managers, the results suggest a diagnostic distinction rather than a universal technology prescription. First, establish who is accountable for entering, checking and correcting stock and supplier data. Second, reconcile sales, purchasing, warehouse and delivery information so that decision-makers work with a coherent record. Third, assess the quality of that information at the point of replenishment. Finally, document which inputs were consulted when approving order quantities or timing. These actions reflect established governance principles (Khatri & Brown, 2010) and the distinction between information sharing and use (Jonsson & Myrelid, 2016).

A practical improvement programme could compare data correction rates, time spent reconciling conflicting records, frequency of documented evidence use and subsequent stock outcomes. Such measures would allow managers to distinguish problems of record governance from problems of integration or decision behaviour. The present coefficients are not an experimental ranking of which intervention would yield the greatest improvement; their role is to focus subsequent evaluation.

Limitations and Future Research

Several boundaries qualify interpretation. The survey relies on purposive recruitment and individual self-reports rather than a probability-based SME sample or independently observed transactions. The fitted paths were estimated from contemporaneous composite scores; accordingly, reverse relationships and unobserved firm characteristics cannot be ruled out. Measurement properties are screened with alpha, separate one-factor indices and HTMT point estimates, but this combination does not amount to a fully validated joint structural measurement model (Sijtsma, 2009; Henseler et al., 2015). The structural specification also excludes direct IG-to-DIU and DIC-to-DIU pathways, limiting claims about the completeness of the proposed intermediary mechanism.

Future research could compare the focused pathway with alternative models retaining direct links, evaluate the constructs through independent confirmatory measurement models, and follow replenishment episodes prospectively. Capturing time-stamped inventory corrections, access and approval logs, supplier lead times and subsequent stock outcomes would provide a firmer basis for testing whether improved governance and integration translate into demonstrably better decisions (Jonsson & Myrelid, 2016; Maxwell & Cole, 2007).

Conclusion

This study investigated the association of information governance and data integration capability with decision information use through information quality among SME inventory decision-makers. Governance and integration each showed positive relationships with information quality, while information quality was positively associated with reported information use. The two specific indirect associations were also positive. By distinguishing the stewardship, integration, quality and use stages, the study offers a more decision-specific application of information-processing theory and a practical basis for evaluating SME inventory information practices. Its conclusions concern observed statistical relationships in reported survey constructs rather than causal effects or independently measured inventory performance.

Theoretical and contextual contribution

Theoretically, the study refines the application of Organisational Information Processing Theory (Galbraith, 1974) by distinguishing two organisational information-processing arrangements—governance responsibilities and cross-source integration—from the perceived quality of information and its reported use in a specific replenishment decision. This decision-level specification connects data-governance research (Khatry & Brown, 2010), information-quality theory (Wang & Strong, 1996) and supply-chain information utilisation (Jonsson & Myrelid, 2016) within one empirically estimated framework, rather than assuming that possession or integration of data entails its use. Contextually, evidence from 360 purposively recruited respondents in Selangor, Malaysia, demonstrates the relevance of separately examining these domains in the operational circumstances of participating SMEs. This adds a geographically and operationally focused illustration to existing research on SME decision support (Teerasoponpong & Sopadang, 2022), while suggesting that managers diagnose record ownership, reconciliation, information fitness and consultation separately. These contributions concern cross-sectional associations in self-reported measures; they neither establish causal mediation nor support generalisation to all Malaysian SMEs or claims of observed inventory-performance gains.

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