

(RESEARCH ARTICLE)



COMPETITIVE INTELLIGENCE PRACTICES AND DECISION SUPPORT IN MOROCCAN FIRMS AN EXPLORATORY ANALYSIS OF AGGREGATE SURVEY DATA

Adil El Yaakoubi * and Brahim Kirmi

Faculty of Legal, Economic and Social Sciences of Tangier, Abdelmalek Essaâdi University, BP 1373, Tangier, Morocco.

* Corresponding Author

ORCID Details

Adil El Yaakoubi: <https://orcid.org/0009-0004-3585-9787>

Global Journal of Engineering and Technology Advances, 2026, 29(01), 332–340

Publication history: Received on 16 September 2026; revised on 22 October 2026; accepted on 24 October 2026

Article DOI: <https://doi.org/10.30574/gjeta.2026.29.1.0299>

Copyright © 2026 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution License 4.0

ABSTRACT

This study examines how competitive intelligence practices are organized and used for decision support in Moroccan firms. A descriptive secondary analysis was performed on internally summing aggregate tables from a doctoral survey reporting 150 responses among 260 contacted firms in Tangier, Casablanca, Fez and Kenitra during January 2024–March 2025. Frequencies, ordinal distributions and model-based Wilson intervals were recalculated; incompatible bases, duplicated items and unreconciled cross-tabulations were excluded. Systematic environmental scanning was reported in 47 of 150 responses (31.3%), whereas 97 (64.7%) reported formalized intelligence processes. High or very high staff awareness was reported in 18 responses (12.0%); strong or very strong integration of information into strategic decisions in 69 (46.0%); and frequent or very frequent training in 58 (38.7%). Performance indicators were present in 57 responses (38.0%). Respondents selected analysis and diagnosis more often than monitoring and evaluation as stages where intelligence was used, with marginal selection rates of 86.7% and 36.7%, respectively. Favorable perceptions of competitive advantage and improvement coexisted with limited reported monitoring, but aggregate data cannot establish whether these characteristics occurred within the same firms. The findings identify priorities for information governance, staff development and decision traceability. They provide an exploratory profile of the tabulated responses rather than evidence of causal performance gains or nationally representative adoption rates.

Keywords: Competitive Intelligence; Decision Support; Information Governance; Business Analytics; Organizational Capabilities; Morocco.

1 INTRODUCTION

Competitive intelligence concerns the organized collection, interpretation and communication of information relevant to strategic action. Its value depends on whether information reaches an appropriate decision maker in a usable form. The field combines managerial practice with several academic traditions, rather than referring to a single software application [1]. A multiphase account of intelligence similarly separates information collection from analysis and

dissemination [2]. For firms considering digital decision support, this distinction matters: installing a reporting tool does not demonstrate that a repeatable intelligence process exists.

Business intelligence and analytics provide a related technological perspective on converting data into organizational insight [3]. Competitive intelligence, as used here, retains a wider emphasis on the external environment, strategic interpretation and the protection of sensitive information. We therefore do not treat competitive intelligence, business intelligence software and artificial intelligence as interchangeable concepts. The survey examined organizational practices; it did not measure software configurations, predictive accuracy or the adoption of artificial intelligence.

Two established theoretical perspectives help explain why the organizational setting should be examined. Absorptive capacity concerns the ability to recognize, assimilate and use external knowledge [4]. Dynamic capabilities emphasize organizational processes that enable adaptation as conditions change [5]. These perspectives motivate attention to staff awareness, training, information sharing and decision use. They do not, by themselves, establish that any observed practice improves performance in the firms studied.

The relationship between intelligence and strategy execution remains particularly relevant. A review of 33 publications identified uneven attention to implementation and evaluation compared with strategy development [6]. This distinction suggests a practical research question: are intelligence activities reported throughout the strategic process, or are they concentrated in initial diagnosis and strategic choice? An answer requires keeping the stages separate and recognizing that respondents can select several stages.

This article develops a focused empirical account from the aggregate survey material in a doctoral manuscript on competitive intelligence and Moroccan firm performance [7]. The source contains useful descriptive distributions but also inconsistencies across denominators, questionnaire categories and cross-tabulation margins. The present contribution is a transparent reanalysis of a restricted set of tables, with explicit inclusion rules and reproducible calculations. It does not claim to validate the broader causal model advanced in the source manuscript.

The objectives are to describe reported intelligence routines, summarize the ordinal intensity of awareness and decision use, and examine the marginal distribution of intelligence use across strategic stages. A further objective is to translate these descriptions into requirements for a decision support process that could be evaluated prospectively. The empirical scope is the tabulated survey responses. No hypothesis about causal performance effects is tested.

2 MATERIALS AND METHODS

2.1 Study design and source material

We conducted a descriptive secondary analysis of aggregate tables in the supplied doctoral manuscript [7]. The source describes a cross-sectional questionnaire survey conducted from January 2024 to March 2025 in Tangier, Casablanca, Fez and Kenitra. It reports 260 firms contacted and 150 useful responses. The participation fraction is therefore 150/260, or 57.7%. The remaining 110 contacts are obtained by subtraction; their distribution between refusal, unsuccessful contact, ineligibility and incomplete response is not available.

The reported target was firms operating in Morocco across several sectors. The source does not provide a sampling frame, documented selection probabilities, city-specific response counts or a nonresponse comparison. We therefore treat the material as a nonprobability descriptive survey for the purpose of inference. The reported unit is a firm represented by a respondent, but unique-firm identifiers and records establishing one response per firm were unavailable for independent verification. Throughout the results, counts refer to tabulated responses rather than a verified national population of firms.

The instrument contains 50 questions using binary responses, ordinal scales and multiple selections. It covers firm and respondent characteristics, environmental information needs, organizational arrangements, information processes, and perceived performance. The source states that questionnaires were administered directly to relevant managers. Item-level administration dates, a versioned questionnaire, the original response export and records of instrument validation were not supplied for this reanalysis. Accordingly, we do not report psychometric reliability or claim a validated composite capability scale.

2.2 Inclusion rules and data integrity checks

A descriptive item was retained when its categories had interpretable labels, mutually exclusive categories for single-response items, and counts summing to 150. Multiple-response selections were retained separately when the source specified a respondent denominator of 150. We recalculated all percentages from integer counts instead of copying

rounded percentages. The selected tables were checked for nonnegative integer cells, complete arithmetic totals and agreement between response type and denominator.

Tables tabulating 260 units for ostensibly single-response questions were excluded because their relation to the 150 responses could not be established. Information-source counts without a verified respondent denominator were also excluded. The duplicated qualifications item was not counted twice. Firm-size classifications were omitted because questionnaire boundaries differed from the reported categories. Cross-tabulations were excluded from the article because common-variable margins could not be reconciled across the source tables. Internal summation of a retained table is an arithmetic check, not independent confirmation of its data provenance.

The retained source tables are identified in the notes to the article tables and figures. This mapping refers to the numbered analytical version of the manuscript [7]. The analytical choices define a descriptive subset rather than a correction of the complete survey database. No synthetic respondents were created, no unavailable cells were imputed, and no table was interpreted as individual-level joint data.

2.3 Variables and estimands

Binary indicators describe systematic environmental scanning, formalized intelligence processes, adequate qualifications, talent management, collaborative sharing, and the presence of performance indicators. Their estimand is the marginal proportion of affirmative tabulated responses. The labels preserve the organizational meaning reported in the source, but formalization should not be assumed to mean the same thing as routine environmental scanning. Likewise, reporting qualified personnel does not establish the quality of their analytical output.

Five ordered items describe staff awareness, interdepartmental information sharing, protection of strategic information, integration into strategic decisions, and training frequency. The full distributions are retained. For concise interpretation, we additionally describe the upper two response categories of each item. This grouping is an explicit reporting convention and does not define a common maturity threshold across distinct questions. Four-category items describe perceived competitive advantage and perceived improvement; neither is an audited financial outcome.

Strategic-stage use is a multiple-response item. Each selected option is divided by 150. Percentages across options can therefore sum above 100%, and selection of the entire process can overlap with selection of individual stages. These options cannot be converted into mutually exclusive groups, and their sum cannot serve as an intelligence maturity score without additional measurement evidence.

2.4 Statistical calculations and reproducibility

For each category with count x and denominator n , the percentage is $100x/n$. Selected binary proportions are accompanied by Wilson score intervals [8]. With $p = x/n$ and $z = 1.959964$, the interval center is $c = (p + z^2/(2n))/(1 + z^2/n)$, and the half-width is $h = z\sqrt{(p(1-p)/n + z^2/(4n^2))/(1 + z^2/n)}$. The reported endpoints are $100(c - h)$ and $100(c + h)$. This expression, together with the published counts, is sufficient to reproduce every interval in the article.

These 95% intervals are conditional binomial reference intervals. Their interpretation assumes independent responses under a common sampling model. They are not design-based confidence intervals for all Moroccan firms and do not account for selection, clustering, measurement error or source-table uncertainty. The participation fraction is reported without an interval because it describes the recorded contact process. No national weighting or finite-population correction is applied.

Percentages and interval endpoints are rounded to one decimal place. The analysis uses descriptive contrasts only. There are no significance tests, adjusted p -values, regression coefficients or mediation estimates. In particular, the covariance of paired items cannot be recovered from their margins. A contrast between two item percentages is consequently not treated as an independent-samples test or as a within-firm transition. Reporting choices follow the general observational-study principles of specifying the design, variables, participant flow and limitations, without claiming complete STROBE compliance [9]. Calculations and charts were produced with Python using direct arithmetic and Matplotlib.

2.5 Confidentiality and ethics documentation

The source questionnaire promises confidential, anonymous and aggregated use of responses for scientific purposes. The present analysis uses aggregate counts and contains no respondent or company identifiers. An ethics committee approval or exemption reference and a documented consent procedure were not available in the supplied materials. These statements describe the available documentation and do not imply that formal approval or consent was obtained or waived.

3 RESULTS

3.1 Participation and sector coverage

Table 1 summarizes the reported contact process and sector composition. Trade and services together account for 115 of the 150 tabulated responses. Industry and agrifood contribute smaller groups. This composition is relevant to interpretation because practices in information-intensive services and trade may differ from those in manufacturing. Sector-specific adoption rates cannot be estimated from the sector margins alone: the source distributions do not link sector to the retained practice items.

Table 1: Reported participation and sector composition

Characteristic	Count	Percentage
Contacted firms	260	—
Useful responses	150	57.7 of contacts
Other contacts by subtraction	110	42.3 of contacts
Trade	77	51.3
Services	38	25.3
Industry	26	17.3
Agrifood	9	6.0

Note: sector percentages use $n = 150$; contact percentages use $n = 260$. A dash denotes no applicable percentage. Source: manuscript Tables 10 and 16 [7]. Sector percentages may not sum to exactly 100% after rounding.

3.2 Reported organizational routines

Table 2 shows substantial variation across reported routines. Systematic scanning has the lowest affirmative proportion among the organizational indicators listed. Formalized processes and adequate qualifications are reported more often. The interval estimates show the conditional precision of these margins; they do not remove the uncertainty arising from selection and documentation. The distinction between a procedure being described as formal and a practice occurring systematically should be investigated using the original item wording.

Table 2: Affirmative responses on organizational routines

Reported routine	Yes	%	95% interval
Systematic environmental scanning	47	31.3	24.5–39.1
Formalized intelligence processes	97	64.7	56.7–71.9
Adequate staff qualifications	99	66.0	58.1–73.1
Talent management practices	91	60.7	52.7–68.1
Collaborative information sharing	84	56.0	48.0–63.7
Performance indicators present	57	38.0	30.6–46.0

Note: each denominator is 150. Intervals are Wilson binomial reference intervals, not population-representative survey intervals. Source: manuscript Tables 23, 34–37 and 40 [7]. Talent management and qualifications are distinct binary questions, not independently verified staffing assessments.

The margins do not reveal which firms combine these routines. For example, the 97 responses reporting formalization cannot be matched to the 47 reporting systematic scanning. Their 50-response marginal difference does not identify 50 particular firms with formal procedures but no systematic scanning. It indicates a difference between overall reported proportions that warrants paired analysis of the original records.

3.3 Awareness and operational intensity

Figure 1 presents the five-category distributions. Staff awareness is concentrated at the middle and lower levels, whereas protection of strategic information is more concentrated at the upper levels. These are separate dimensions. A favorable protection response may reflect attention to confidentiality without indicating analytical capability or a frequent learning routine.

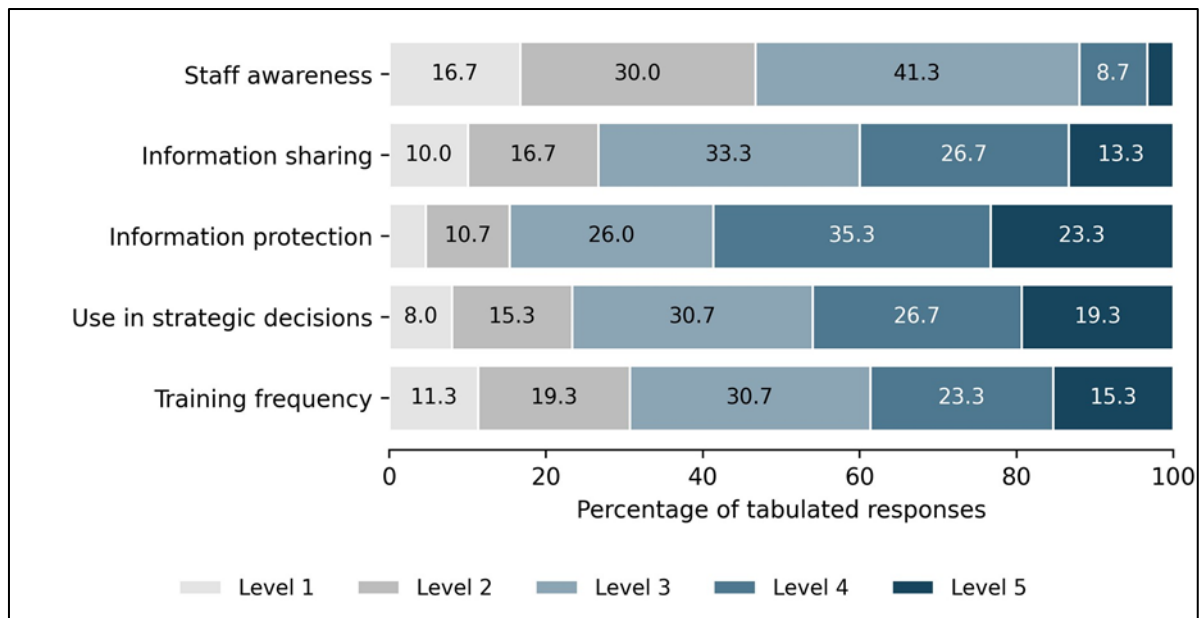


Figure 1: Ordered distributions of five intelligence practices. Each row contains 150 responses. Levels run from lowest to highest. Awareness and sharing use very low to very high; protection uses never to always; decision use uses not at all to very strongly; training uses never to very frequently. Source: manuscript Tables 29–33 [7].

For reproducibility, the five category counts from lowest to highest are 25, 45, 62, 13 and 5 for awareness; 15, 25, 50, 40 and 20 for sharing; 7, 16, 39, 53 and 35 for protection; 12, 23, 46, 40 and 29 for decision use; and 17, 29, 46, 35 and 23 for training.

High or very high awareness accounts for 18 responses (12.0%; Wilson interval 7.7–18.2%). High or very high interdepartmental sharing accounts for 60 responses (40.0%). Strong or very strong use of information in strategic decisions is reported in 69 responses (46.0%), while frequent or very frequent training is reported in 58 (38.7%). These thresholds summarize the upper two categories within each item; they do not provide evidence that the differences between constructs are statistically significant.

Protection is reported as often or always in 88 responses (58.7%). The middle category remains material for all five questions and should not be interpreted as absence of practice. For training, occasional activity may represent a distinct organizational arrangement from either regular development or no training. Reporting the full distribution avoids disguising this distinction through a single mean score based on arbitrary numerical spacing.

3.4 Perceived outcomes and measurement practices

Table 3: Distributions of perceived outcome ratings

Outcome	Response category	Count	%
Competitive advantage	Low	17	11.3
Competitive advantage	Moderate	30	20.0
Competitive advantage	Important	63	42.0
Competitive advantage	Very important	40	26.7
Perceived improvement	Low	14	9.3
Perceived improvement	Moderate	28	18.7
Perceived improvement	Substantial	62	41.3
Perceived improvement	Very substantial	46	30.7

Note: each question has n = 150. These are subjective ratings; substantial does not mean statistically significant. Source: manuscript Tables 41 and 42 [7].

Table 3 retains all four categories of the perceived outcome questions. The upper two categories account for 103 responses (68.7%) for competitive advantage and 108 (72.0%) for perceived improvement. The original improvement labels contain the French word *significative*. Here they are rendered as substantial and very substantial to distinguish respondent judgments from statistical significance. No objective baseline, counterfactual comparison or independently measured financial gain was available.

The presence of favorable outcome perceptions alongside performance indicators in only 57 responses identifies a useful measurement question. It does not show that respondents without indicators supplied favorable ratings, because the two items have not been linked. The appropriate next step is to distinguish perceived benefits, documented decision outcomes and measured organizational performance within a common record structure.

3.5 Use across the strategic process

Figure 2 displays marginal selections for strategic-stage use. Analysis and diagnosis and the choice of strategic directions are selected more frequently than implementation or monitoring and evaluation. The difference between the analysis and monitoring margins is 50.0 percentage points, obtained directly from 130/150 minus 55/150. It describes the distribution of reported uses across options; without paired selections it is not an estimate of a firm-level decline or a tested stage effect.

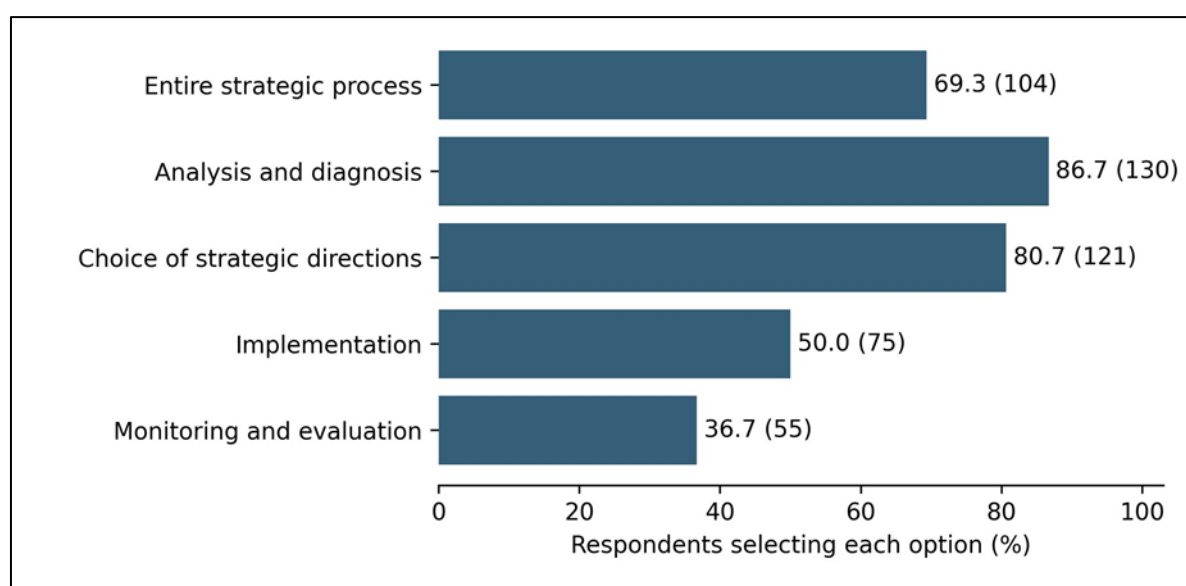


Figure 2: Reported stages of strategic use. Bars show the percentage of 150 respondents selecting each option; labels provide percentages and counts. Multiple selections were permitted, including an overlapping entire-process option. The five counts sum to 485 selections. Source: manuscript Table 43 [7].

The entire-process option was selected by 104 respondents. Its overlap with specific stages is unknown. Consequently, those responses cannot be added to the stage-specific counts or treated as evidence that every stage was used in precisely 104 firms. The most defensible reading is that the questionnaire elicited broad and specific accounts of use simultaneously, making the stage margins informative but unsuitable for a mutually exclusive process classification.

4 DISCUSSION

4.1 What the descriptive profile adds

The retained tables portray several distinct organizational dimensions rather than a uniformly high or low level of intelligence capability. Procedure formalization and reported staff qualifications are relatively common, whereas systematic scanning, high awareness and explicit performance indicators are less common. These margins suggest questions about how organizational arrangements translate into repeatable information work. They do not establish that procedural formality is ineffective, because no verified joint comparison of formalization and outcomes is available.

This interpretation is consistent with treating intelligence as a process rather than a collection activity alone [1,2]. The present article adds a transparent description of selected Moroccan survey tables, not a comparison proving that Moroccan firms differ from firms elsewhere. Geographic and sector differences, instrument wording and sampling designs would need to be harmonized before making an international ranking or estimating a contextual effect.

The awareness and training distributions are relevant to the absorptive-capacity perspective [4]. Information cannot be assumed to become usable knowledge solely because it is available. Staff need to recognize relevance, interpret competing accounts and communicate implications. The survey does not measure these cognitive processes directly, so the theoretical connection is interpretive. A follow-up instrument should assess identifiable tasks, such as source evaluation and the ability to explain a recommendation, rather than infer competence from an affirmative qualifications response.

4.2 Decision support and information quality

From an information systems perspective, the results motivate attention to the conditions under which an intelligence output is used. Data quality extends beyond numerical accuracy to contextual relevance, representation and accessibility [10]. A report can contain correct values yet arrive too late, omit provenance or fail to address the decision being considered. The present data do not assess these quality dimensions, but their explicit measurement would improve the distinction between possessing information and using it effectively.

Information systems success frameworks also distinguish system characteristics, use and organizational benefits [11]. This distinction cautions against treating favorable perceptions of improvement as verification of system success. Here, performance indicators, decision use and outcome perceptions are separate questions. Their joint measurement would permit a clearer assessment of whether the information process produces traceable changes in decisions, and whether those changes are associated with subsequent outcomes.

A practical decision support design should therefore connect an intelligence request to a named decision, retain the sources and collection dates, document the analyst's interpretation, and record the action chosen. An accessible repository could store these records using controlled access and version history. The technology choice should follow the information requirements and available skills. The survey does not justify recommending a particular commercial platform or claiming that automation would improve outcomes.

4.3 Closing the evaluation stage

The strategic-stage pattern gives a specific direction for prospective work. Intelligence use is reported more frequently around diagnosis and choice than around monitoring. This corresponds to the literature's concern that implementation and evaluation receive less attention than strategy formulation [6]. The similarity is conceptual: differences in questions and study designs prevent a numerical comparison with that review.

An evaluable workflow would begin by defining the decision and an observable success criterion before collecting information. Analysts would then preserve an evidence trail, communicate options with uncertainty, and record the decision date. A later review would compare expected and observed outcomes while documenting market changes and other concurrent actions. Such a workflow is a proposed application of the findings, not an intervention tested by this survey.

For example, a firm reviewing a supplier change could record the initial question, the price and reliability evidence available at the decision date, the chosen option, and later delivery performance. A completion rate for scheduled reviews and the proportion of recommendations with identifiable evidence could serve as process measures. Financial or service benefits would require separate outcomes, a suitable comparison and a defined observation period. A high process completion rate alone would not demonstrate economic benefit.

Limitations and requirements for further research

The main limitation is reliance on aggregate tables whose underlying records were not independently available. Arithmetic consistency supports reproducibility of the reported summaries but does not verify whether the counts were entered correctly or whether the intended questions were administered consistently. Excluding incompatible tables reduces identifiable interpretive problems; it does not certify the retained subset as free of measurement error.

Selection and nonresponse also limit interpretation. The four-city coverage and sector mix are useful descriptive context, but response counts by city, recruitment channels and selection probabilities are not documented in sufficient detail for population inference. The 57.7% participation fraction does not quantify nonresponse bias. Firms concerned about confidentiality or lacking formal arrangements may respond differently, and the direction or magnitude of this difference cannot be estimated here.

Measurement is another constraint. The questionnaire mixes binary questions and ordered categories with different labels. Some apparently related constructs may capture different organizational phenomena. Translation preserves the intended ordering but has not undergone a documented bilingual validation procedure. Staff awareness, qualifications, protection and training should not be summed into a composite score merely because each refers to intelligence work.

Finally, a cross-sectional self-report design cannot establish temporal order or causal effects. Managers who perceive favorable performance may also evaluate their information practices favorably. Aggregate margins cannot be used to estimate these respondent-level dependencies. No claim is therefore made about mediation, predictive accuracy, return on investment or superiority over alternative managerial practices.

Further research should begin with a reconciled response-level database, a versioned questionnaire and a data dictionary identifying item wording, valid denominators and multiple-response coding. Unique firm identifiers should be maintained confidentially to verify the unit of analysis. A prospective design could then separate initial capabilities, subsequent decision use and later outcomes. Sampling, measurement validation and the analysis plan should be defined before testing relationships. This would allow the proposed workflow to be evaluated rather than assumed to be effective.

5 CONCLUSION

The selected survey tables provide an exploratory description of competitive intelligence practices in Moroccan firms. They indicate variation between organizational arrangements, staff awareness, operational routines and evaluation practices. Intelligence is reported more often at diagnosis and strategic choice than at monitoring and evaluation, while favorable outcome perceptions are more common than the presence of explicit performance indicators. These findings support practical attention to staff development, information provenance, decision traceability and scheduled review. They do not establish causal gains, firm-level combinations of practices or national adoption rates. A reconciled respondent-level database and a prospective evaluation are needed before testing whether the proposed decision support workflow improves organizational outcomes.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

This article draws on the doctoral research material attributed to Adil El Yaakoubi at Abdelmalek Essaâdi University. No grant identifier or specific financial support was documented in the materials supplied for the preparation of this manuscript.

Disclosure of conflict of interest

A signed conflict-of-interest declaration was not available in the source documentation. The authors must provide their financial and non-financial disclosures before submission.

Data availability

The aggregate counts used for this analysis are reported in Tables 1–3, the text accompanying Figure 1 and the labels of Figure 2, with source-table identifiers. Individual responses were not available for this secondary analysis. The source manuscript is unpublished material; permission for any wider release of its full contents must be determined by its authors.

Use of generative artificial intelligence

Generative artificial intelligence assisted with English drafting, manuscript organization, coding and statistical presentation. Responsibility for verifying the source data, interpretation, references and final text remains with the authors. No individual observations were generated to replace unavailable survey data.

REFERENCES

- [1] Calof JL, Wright S. Competitive intelligence: a practitioner, academic and inter-disciplinary perspective. *Eur J Mark.* 2008;42(7/8):717–730. doi:10.1108/03090560810877114.
- [2] Dishman PL, Calof JL. Competitive intelligence: a multiphasic precedent to marketing strategy. *Eur J Mark.* 2008;42(7/8):766–785. doi:10.1108/03090560810877141.
- [3] Chen H, Chiang RHL, Storey VC. Business intelligence and analytics: from big data to big impact. *MIS Q.* 2012;36(4):1165–1188. doi:10.2307/41703503.
- [4] Cohen WM, Levinthal DA. Absorptive capacity: a new perspective on learning and innovation. *Adm Sci Q.* 1990;35(1):128–152. doi:10.2307/2393553.

- [5] Teece DJ, Pisano G, Shuen A. Dynamic capabilities and strategic management. *Strateg Manag J.* 1997;18(7):509–533. doi:10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.
- [6] Maluleka ML, Chummun BZ. Competitive intelligence and strategy implementation: critical examination of present literature review. *S Afr J Inf Manag.* 2023;25(1):a1610. doi:10.4102/sajim.v25i1.1610.
- [7] El Yaakoubi A. L'impact de l'intelligence économique sur la performance des entreprises: cas des entreprises marocaines [unpublished doctoral manuscript]. Tangier: Faculty of Legal, Economic and Social Sciences, Abdelmalek Essaâdi University; [date unknown]. Analytical version titled *These_Statistiques*, supplied for the present study.
- [8] Wilson EB. Probable inference, the law of succession, and statistical inference. *J Am Stat Assoc.* 1927;22(158):209–212. doi:10.1080/01621459.1927.10502953.
- [9] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLoS Med.* 2007;4(10):e296. doi:10.1371/journal.pmed.0040296.
- [10] Wang RY, Strong DM. Beyond accuracy: what data quality means to data consumers. *J Manag Inf Syst.* 1996;12(4):5–33. doi:10.1080/07421222.1996.11518099.
- [11] DeLone WH, McLean ER. The DeLone and McLean model of information systems success: a ten-year update. *J Manag Inf Syst.* 2003;19(4):9–30. doi:10.1080/07421222.2003.11045748.