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Data quality governance in market intelligence: an architecture for reliable analytical decisions.

Data quality governance in market intelligence: an architecture for reliable analytical decisions

Data quality governance in market intelligence: an architecture for trustworthy analytical decisions

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Summary

Market intelligence depends on the ability to convert heterogeneous data into useful, traceable interpretations that are proportionate to uncertainty. This article presents a narrative review on data quality, governance, predictive modeling, and the managerial use of indicators. It proposes a conceptual architecture that connects decision-making requirements, data meaning, quality controls, analytical method, communication of uncertainty, and outcome monitoring. The contribution is didactic and does not correspond to a validated protocol, proprietary system, or specific company evaluation.

It is argued that analytical confidence stems not only from the accuracy of models, but also from the consistency between definitions, origin, access, context, and use. Governance should preserve informational value without expanding data collection, surveillance, or automation beyond what is necessary.

Keywords: data governance; data quality; market intelligence; analytics; decision making; predictive models.

Abstract

Market intelligence depends on the ability to convert heterogeneous data into useful, traceable interpretations that are proportionate to uncertainty. This narrative review examines data quality, governance, predictive modeling, and managerial use of indicators. It proposes a conceptual architecture connecting decision requirements, data meaning, quality controls, analytical methods, uncertainty communication and outcome monitoring. The contribution is educational and does not constitute a validated protocol, proprietary system or assessment of a specific company. Analytical trust is argued to depend not only on model accuracy, but also on consistency across definitions, provenance, access, context and use. Governance should preserve informational value without expanding collection, surveillance or automation beyond what is necessary.

Keywords: data governance; data quality; market intelligence; analytics; decision-making; predictive models.

1 INTRODUCTION

The expansion of digital systems has increased the availability of commercial and financial information.

and operational, but it did not eliminate the difficulty of decision-making. Organizations can accumulate databases,

panels and models without ensuring that concepts, periods, units, and responsibilities are

comparable.

Market intelligence begins before visualization, when you define what question you will ask.

answered, for whom and with what usage limits. Without this framework, the volume of data tends

to enhance the appearance of accuracy without necessarily improving judgment.

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Wang and Strong (1996) demonstrated that data quality is multidimensional and must be evaluated.
From the perspective of the user of the information. Accuracy is relevant, but not sufficient. Completeness,
consistency, timeliness, interpretability, accessibility, and suitability for purpose are also important.
They determine the value. In market intelligence, a correct series may be of little use if it reaches...
later, if it does not have granularity compatible with the decision or if its definition diverges from that.
adopted by another area.
Data governance provides mechanisms for distributing decision-making rights and responsibilities.
Khatri and Brown (2010) distinguish domains such as principles, quality, metadata, access, and cycle.
of life. This approach avoids treating governance as synonymous with technology or centralization.
The managerial question is to establish who can define, produce, modify, access, interpret and
Discontinue each informational element, while preserving responsiveness and control.
proportional to the risk.
This article aims to propose a reliability architecture for market intelligence.
The framework integrates quality, governance, predictive methods, communication, and learning.
decision-making. The study does not report personal experience, does not use company data, and does not compare.
suppliers. Its focus is educational: organizing concepts that allow one to assess whether an analysis can
to support the decision for which it was requested.

2 METHODOLOGY

A narrative review of both conceptual and applied character was conducted. The selection prioritized seminal articles.
on data quality and governance, methodological works on prediction, documents
Quality management techniques and references on data-driven decision making. The organization of
This text was inspired by the relevance, substantiation, and transparency criteria of SANRA, a scale developed by
Baethge, Goldbeck-Wood, and Mertens (2019).1
The conceptual searches encompassed combinations of terms in English and Portuguese related to date.
quality, data governance, market intelligence, predictive analytics, decision support, provenance and
uncertainty. Publications with DOIs, identifiable standards, and books from publishers were prioritized.
academic. The selection was not intended to be exhaustive of the literature, to calculate combined effects, or to reproduce
systematic review procedure.
The findings were organized by function in the decision-making chain. First, the definition of

1The SANRA scale guided the transparency of the narrative review, but was not used as certification, external scoring, or a substitute for a systematic protocol.

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Quality suitable for use. Next, decision-making rights, metadata, and controls were analyzed.
of access, modeling, and communication. Finally, the elements were synthesized into an architecture.
that connects requirements, data, controls, analysis, decision-making, and monitoring. This organization is
This is analytical and does not represent a mandatory sequence in all organizations.
The review has limitations. The diversity of contexts makes generalizations about effects difficult.
Governance programs. Observational studies may exhibit selection bias, measures
Self-reported evidence and reverse causality. Furthermore, norms and technologies evolve. For these reasons,
Recommendations are formulated as design principles and control questions, and not as...
performance or compliance guarantee.

3. QUALITY AS FITNESS FOR DECISION-MAKING USE

Data analysis should begin with the decision, not the available data. The initial question is: what
The consequences can result from the use of the information. An error in an exploratory panel has an impact.
Unlike an error that alters price, commercial priority, or performance evaluation. This
The distinction guides tolerances, validation frequency, reconciliation needs, and degree of review.
Human. Uniform controls for all data can waste resources and, paradoxically,
leaving critical elements without sufficient attention.
The intrinsic dimension involves the plausibility and correctness of the value, but its verification depends on
Reference. In market data, the truth may not be immediately available. Estimates,
Third-party research and records have their own methods and margins. Governance needs to
Document the source, date, transformation, and hypothesis. The absence of a reference does not make the data valid.
automatically useless, but requires that its esteemed nature be communicated to avoid
Interpretation as direct observation.
The contextual dimension considers timeliness, granularity, and relevance. Monthly data can
Supporting planning but inadequate for daily response. National averages may mask variations.
Regional categories. Historical categories may lose their correspondence after portfolio changes. A
Suitability, therefore, should be reassessed when the question, the process, or the competitive environment changes.
They change. Quality is not a fixed attribute stored alongside value, but a relationship between information,
context and use.2

Representation and interpretability also affect decisions. Similar names may designate

2. Quality is suitable for use. The same data may be sufficient for descriptive monitoring but inadequate for individual decision-making, forecasting, or causal inference.

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Different metrics, while distinct names may represent the same phenomenon. Dictionaries of
Data, formulas, examples, and inclusion rules reduce ambiguity. These resources should be...
understandable for business users, as purely technical documentation can preserve
The transformation continues, yet it fails to explain its managerial significance.
Accessibility needs to be balanced with security and minimization. Inaccessible data does not generate...
Value exists, but unrestricted access increases the risk of misuse, exposure, and uncontrolled alteration.
Rights should reflect purpose, function, and sensitivity. Mature governance avoids both obstacles.
which encourage parallel spreadsheets as well as broad permissions that eliminate traceability.

4. DECISION-MAKING RIGHTS, METADATA AND LIABILITY

Khatri and Brown (2010) discuss governance as the definition of decision-making rights and the provision of
accounts. This formulation helps to distinguish governance from management. Governance establishes principles,
Responsibilities and criteria; management executes processes of collection, integration, correction, and delivery. In
In smaller structures, a person can accumulate roles, but the decisions remain conceptually the same.
distinct. The accumulation must be visible so that conflicts and dependencies can be assessed.
The business owner is responsible for the meaning and authorized use, while the custodian
A technician maintains platforms and controls. A quality manager coordinates rules and exceptions.
and users provide evidence regarding suitability. The names of the roles vary, but the separation of
Assigning responsibilities reduces the risk of an indicator being technically stable but semantically incorrect.
It also facilitates decisions regarding changes that affect historical data series and external commitments.
Metadata constitutes the infrastructure for understanding. It should record the definition, origin,
Periodicity, unity, transformation, responsibility, sensitivity, and limitations. Lineage adds
The sequence in which the value was captured, combined, and presented. These elements support
Investigation of discrepancies and impact analysis. Without lineage, a local correction may be
reproduced incorrectly in multiple reports or disappearing in the next update.
Change management is necessary because metrics evolve. Legitimate changes may occur.
strategy, regulation, system, or learning. The problem is not change, but change without recording.
Date, reason, approver, and effect on comparability. Versions and validity periods allow
preserve the historical record. When reconciliation is not possible, the series break should be indicated in
instead of being hidden by graphic continuity.
Data forums should decide on exceptions and priorities, not just track tasks. An agenda
Useful information includes recurring incidents, definition conflicts, access risks, critical dependencies, and...
pending decisions. Effectiveness can be assessed by the reduction in recurrence and the time until resolution.

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The solution, not the number of meetings. Governance that produces documentation without altering the causes.
It tends to lose legitimacy.

5 Predictive Modeling, Validation, and Uncertainty

Predictive models support market intelligence by estimating demand, propensity, risk, or
answer. Shmueli and Koppius (2011) distinguish between explanation and prediction, objectives that require
Different assessments. A model may describe plausible relationships and predict poorly out-of-sample scenarios;
Another person might predict it adequately without supporting a causal interpretation. The purpose must be defined.
before selecting variables, metrics, and the form of communication.
Out-of-sample validation reduces the risk of confounding historical fit with future capability.
Temporal divisions are especially important when considering the market, price, and behavior.
They change. The choice of metric should also reflect the cost of errors. Aggregate accuracy can
to mask rare classes, strategic segments, or asymmetries between false positives and false negatives.
No single metric is useful in all contexts.
Information leakage occurs when the model uses a variable that would not be available in the
The actual moment of the decision, or the outcome itself, becomes irrelevant. Apparent performance becomes unrealistic.
Controls include time-based review, availability documentation, and pipeline replay.
Governance must encompass data, code, parameters, and environment, as the same formula can produce...
Different results are obtained when sources or transformations change.
Uncertainty needs to be communicated in decision-making language. Intervals, scenarios, and sensitivities.
They show that forecasts are not future facts. The presentation should indicate the time horizon, population, and date.
training and usage conditions. When uncertainty is high, the recommendation may be
experiment, gather additional information, or limit exposure, instead of choosing
The highest predicted value is automatically selected.
After deployment, performance and context should be monitored. Changes in data profile,
Monitoring the relationship between variables or the business process can reduce validity.
It means to retrain automatically. First, it is necessary to investigate the cause, impact, and risk. Figure
1 represents this chain and highlights that the decision generates evidence that returns to the initial requirement.

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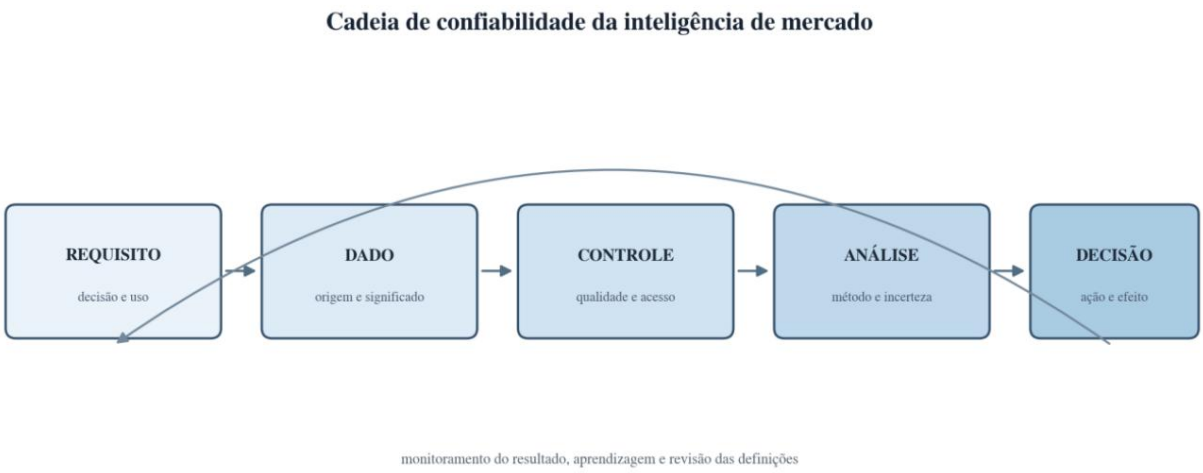

Figure 1. Market intelligence trust chain

Source: own elaboration based on Wang and Strong (1996), Khatri and Brown (2010) and Shmueli and Koppius (2011).

6 Indicators, Dashboards, and Executive Communication

Dashboards are decision interfaces, not metric repositories. Each indicator should have its own question.
Associated metrics include definition, periodicity, responsible party, and possible action. Metrics without a related decision.
They increase cognitive load and encourage selective reading. The selection process should balance outcomes.
Drivers, risks, and capacity. A lean dashboard can be more informative when it allows...
Explore exceptions and understand causes.
Denominators and cohorts are essential. Absolute growth may reflect base expansion;
Conversion rates may change because the entry profile has changed; average profitability may obscure segments.
Deficient. Comparisons need to keep population and time frame consistent. When this is not possible,
The methodological difference should be indicated. Standardization does not eliminate analysis, but it prevents it from happening.
Strategic discussions are being consumed by basic reconciliation.
Goals influence behavior. An indicator used for learning can change in nature.
when associated with reward. People adapt actions accordingly and can optimize the number in
to the detriment of the objective. Governance must consider side effects, combine measures, and review.
Incentives. Activity indicators should not be presented as results, and results
Intermediaries should not be confused with causal impact.
Executive communication requires separating observation, interpretation, and recommendation. Observation

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It describes what the data shows; the interpretation proposes explanations; the recommendation indicates action and risk. Mixing these layers makes questioning and learning difficult. Alternative hypotheses should Clarity should be presented when plausible. Clarity does not depend on eliminating uncertainty, but on making clear. Explicitly stating what is known, inferred, and not yet verified.

Visual narratives should preserve scale, unity, and period. Avoid truncated axes and aggregations. Incompatible elements or excessive emphasis can alter perception. The review should verify if the graphic... It answers the question without suggesting non-existent causality. The quality of communication is an integral part of analytical quality is important because a correct analysis can lead to an inappropriate decision when presented. in an ambiguous way.

7. Automation, Privacy and Controls

Automation can reduce repetitive tasks and increase consistency, but it can also reproduce errors. in terms of speed. Before automating, the process must have a purpose, input, rule, exception, and Responsible. Automating an unstable workflow can obscure decisions in integrations that are difficult to audit. The priority should consider volume, repetition, risk, and the ability to reverse the trend, and not just... Technological availability.

Preventive controls include format validation, mandatory requirements, and a plausible range. Controls Detectives identify anomalies, reconciliation discrepancies, and unexpected changes. Controls Corrective measures define how to contain, correct, and communicate. The combination depends on the level of criticality. Blocking all exceptions can disrupt legitimate operation; accepting all exceptions transfers the problem. for later stages. Rules require a channel for processing and learning.

Privacy requires purpose limitation, minimization, and protection throughout the lifecycle. Data Commercials may contain personal information of customers, employees, and partners. Technical availability does not equate to ethical or legal authorization. Aggregation, pseudonymization, Limited retention and export controls reduce exposure, but should be evaluated accordingly. context and applicable legislation.

Using third-party data requires knowledge of its origin, terms, updates, and auditability. Purchased or enriched assets may contain biases and errors that are difficult to refute. Contracts do not eliminate decisional responsibility. The organization must assess suitability, record limitations, and anticipate. Replacement. Supplier dependence becomes a risk when definitions or access may change. incapable of reproduction.

Automated models that affect people require supervision commensurate with the impact. Review. Human opinion should not be symbolic. The reviewer needs information, authority, and time to disagree.

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Records must allow for the reconstruction of input, version, and result. These requirements support dispute resolution.
and learning without promising complete elimination of risk.

8. Proportional Implementation and Learning

Implementation can begin with a high-value, known-recurring decision. The first step
It involves mapping the question, users, sources, transformation, and consequences. Then, the following are identified:
Conflicting definitions, access gaps, and existing controls. This approach avoids broad programs.
that consume energy before demonstrating usefulness. Expansion occurs after stabilizing the cycle and
Record learning.
Priorities can be defined by combining impact, frequency, exposure, and difficulty of...
Detection. Critical data receives more robust rules, responsibilities, and monitoring. Data
Exploratory operations can operate with light controls and limitation warnings. This differentiation preserves
Agility. Proportional governance does not mean a lack of rigor, but rather the adaptation of rigor to...
consequence of use.
Training needs to include interpretation and responsibility, not just tools. Users should
Understanding definition, uncertainty, and limits. Technical teams need to know the process of
Business. Leaders must know how to formulate questions and recognize when the data does not support the claim.
decision. Cross-translation reduces incomplete translations and strengthens a common language.
Continuous improvement depends on incidents and disagreements being treated as sources of learning.
Root cause analysis should examine the process, system, definition, and incentive, avoiding attributing everything to root causes.
Failure is due to individual error. Corrective action needs to have an assigned person, a deadline, and verification of effectiveness.
Recurrence indicates that the correction did not address the root cause or that the context has changed.
The proposed architecture integrates these practices in a cycle, but does not determine a single structure.[3]
Organizations differ in size, risk, and capacity. The maturity criterion is the possibility of...
to explain why a given piece of data is suitable, how it was transformed, who was responsible for the decision, and what
It happened later.

CONCLUSION

Reliable market intelligence doesn't begin on the dashboard nor end with the executive presentation. It

3The proposed model is a didactic synthesis. It lacks psychometric or operational validation and should not be presented as a proven effective method.

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It depends on a chain that begins with the formulation of the question and continues through the definition, origin, Transformation, analysis, communication, decision-making, and monitoring. The fragility of any link can... compromising the value of others, even when the tool and model are technically sophisticated.

Quality should be understood as fitness for use. Accuracy alone does not solve problems. of timeliness, granularity, interpretability, or access. The decision and its consequence guide the level of control required. This perspective allows resources to be focused on critical data without to impose the same bureaucracy on every analytical experiment.

Governance distributes decision-making rights and responsibilities. Business owners, custodian Technical experts, quality managers, and users offer complementary perspectives. The clarity of Roles reduce conflict without eliminating collaboration. Metadata, lineage, and change management. They retain meaning and comparability over time.

Predictive models add value when their purpose, validation, and uncertainty are transparent. Past performance is no guarantee of future usefulness. Metrics need to reflect the cost of errors, and Predictions should be treated as conditional estimates. Subsequent monitoring connects to analysis of organizational learning.

Panels and narratives influence interpretation. Separating observation, hypothesis, and recommendation makes... Examinable reasoning. Indicators must have a denominator, context, and associated action. A Visual clarity cannot be achieved by obscuring boundaries or by using techniques that exaggerate differences.

Automation increases consistency and scale, but it can multiply failures. Processes need rules. Exceptions, accountability, and the ability to reverse decisions. Privacy, access, and oversight must be... Proportional to the impact. Human review only adds protection when there is real authority. to contest the result.

This study is a narrative review and does not empirically validate the proposed architecture. The synthesis does not It replaces legal assessments, information security measures, or local testing. Its usefulness lies in organizing governance questions and how to make the decision-making chain more traceable for teaching, planning and interdisciplinary discussion.

Future research could compare governance models by size and sector, and evaluate longitudinally track incidents and measure how the transparency of definitions affects trust and usage. Studies can also investigate conditions under which automation and artificial intelligence improve decisions that do not increase inequality, surveillance, or technological dependence.

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