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EVALUATION OF THE DIFFERENT CONTROLLING PATTERNS OF COMPANIES OPERATING IN PRIME STAGE

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INTRODUCTION

Research background and relevance

In today's dynamic business environment, the role and significance of controlling have become fundamental to corporate success. Across the distinct stages of a firm's life course, organizations face different challenges, opportunities, and constraints. Managing these effectively is essential for sustainable growth and competitiveness. As a strategic and operational toolkit, a controlling mindset plays a particularly important role in managing corporate life cycles. It enables organizations to adapt to constantly changing market conditions and internal needs. Of special interest are those companies that occupy a critical phase in the development life cycle where size and organizational maturity already provide sufficient complexity and capacity to apply advanced controlling methods, yet they have not reached the status of large multinational conglomerates whose extensive and intricate controlling networks would exceed the scope of a doctoral dissertation. This work therefore focuses on uncovering the controlling patterns of firms operating in such a life-cycle stage. In my research, this stage corresponds to Adizes' (2023) Prime (Adulthood). According to the Adizes Institute, Prime is the optimal balance between control and flexibility, and on the curve it is not a point but a phase (ADIZES INSTITUTE, 2023). Studying these companies has both theoretical relevance and practical utility, particularly in the Hungarian business context. Observing organizations in the Prime stage across sectors and cultural settings yields, on the one hand, recurring and robust controlling schemes, and, on the other, context-sensitive elements. The empirical base of the analysis consists of 12 case studies. A structured analysis of these cases allows me to formulate relevant, well-founded, and generalizable statements about companies in the Prime phase and their controlling patterns. My aim is for the practices presented to provide tangible cues for improving corporate governance and controlling. Consequently, I seek to report the results in a form useful to executives, finance professionals, and the academic community alike, thereby contributing to the advancement of controlling as both a science and a practice.

For me, controlling is not merely a measurement technique but a shared framework that binds goals, action, and interpretation into a whole. Corporate operations always involve the tension between strategic intent and everyday decision-making. The value of controlling lies in providing a shared conceptual vocabulary and a traceable logic so that different actors speak about the same reality. Unsurprisingly, in successful organizations controlling does not function as external policing but becomes a natural part of managerial dialogue. I also see the task of the introduction as establishing the language in which responsible decisions are interpreted. The significance of controlling is reinforced

by the fact that competition for resources is everyday reality in most organizations. Good decisions depend not only on the amount of information, but on whether the system highlights the material differences and directs attention to where genuine impact can be achieved. In my experience, this is where controlling becomes truly useful, because it helps maintain consistent reasoning amid uncertainty.

The point is not to emphasize all variables at once, but to enable the firm to distinguish trend from noise and select tools accordingly. Thus the controlling function does not narrow to recording the past; it becomes a framework for shaping the future.

This raises the question of how digitalization affects the language of controlling. In practice it is now rare to separate the description of operations from data management and data interpretation. Digitalization is not an end in itself, but an infrastructure that enables organizations to approach real-time understanding. In practice this means that data reach decision-makers with less manual intermediation and fewer interpretive losses, and feedback loops enter subsequent steps more rapidly. At the same time, the rapid growth of data assets does not in itself solve decision-support problems: controlling must preserve signal-to-noise ratio, common definitions, and reliability of data lineage. International overviews indicate that digitalization's performance impact is realized when analytics and AI are genuinely embedded in managerial control systems and KPI logic; otherwise complexity increases while benefits remain contingent (FÄHNDRICH, 2023). In this research I do not approach from a technological catalogue of tools; rather, I start from the premise that digitalization is useful when it improves decision quality, transparency, and clarity of accountability. It is also essential that digital solutions rest on shared definitions and a consistent conceptual order, because this makes the language of controlling equally understandable for all stakeholders.

In my work I have collaborated with companies across many parts of the world, and I have consistently found the diversity of perspectives across cultural contexts to be striking. In Europe I often encountered an appreciation for coherent rule systems and a consistent order of concepts, while dialogue and local problem-solving remained important. In the Anglo-Saxon context I more frequently saw a stronger emphasis on performance and results, closely linked to clear accountability and goals. In Japanese companies, in my experience, more space is given to collective learning, continuous improvement, and consensus-oriented preparation. These three worlds should not be judged against each other, as in reality the same problems recur—only approached from different angles. I have observed that doubts and points of contention are very similar; differences often lie in the logic of posing questions and in the rhythm of decision preparation. Hence controlling does not seek uniformity but creates a common core refined by local context. From this follows the idea that controlling is, in fact, also a work of translation. The organization uses different language games; finance, operations, and sales speak differently. Controlling builds passageways between them and helps ensure

that concepts do not glide past one another. Digitalization is a partner in this by providing a stable foundation for shared data interpretation, but in the end decision quality is determined by human judgment. For this reason I consider it important that the introduction also make the human side of the controlling mindset visible. The goal is not to provide ready-made recipes for every situation, but to furnish a thinking framework for the later chapters in which diverse corporate situations can be understood according to the same logic.

To complement the above, I also wish to nuance the interpretation of differences among cultural spheres. The differences do not mean that one approach is superior to the others. Rather, organizations choose different paths toward the same ends. European practice often seeks a balance of regulation and dialogue; in the Anglo-Saxon world measurability and accountability receive greater emphasis; in Japan the natural frame is continuous process improvement and shared responsibility. My experience is that the common core everywhere is clear goals, a traceable cause-and-effect logic, and learnable decision patterns. If this is present, local trappings do not obscure the essence; indeed, they add to comprehensibility. I do not venture here to pronounce detailed propositions, nor do I promise ready solutions for all cases. My aim is to clarify why it is worthwhile to regard controlling not as technique but as a shared framework for thinking, and why it is important that digitalization and cultural specifics be fitted into this frame. The subsequent chapters therefore follow the sequence of conceptual clarification, methodological considerations, and empirical observations so that a coherent story of the language of controlling unfolds—one that relies both on experience and sound reasoning.

Throughout the dissertation I sought to combine professional depth with clarity of language. Given the nature of the topic, complex phrasing and foreign-origin technical jargon are often unavoidable. Avoiding these or forcing artificial ‘Hungarianization’ would, in my view, significantly reduce the scholarly character and practical applicability of the research. To ensure that the work is understandable beyond a narrow group of practitioners, I provide the Hungarian equivalents in parentheses alongside foreign terms, and the List of Abbreviations at the start expands all abbreviations in both English and Hungarian.

Research objectives

The business environment of the twenty-first century is simultaneously fast and layered; companies therefore do not follow an abstract ideal but pursue their own growth path. Along this path, controlling is not merely a measurement technique but a governance mindset: a shared language that connects goals, accountabilities, and everyday decisions.

Within this logic I do not seek a catalogue of tools; I seek to understand how controlling makes decisions tangibly better. I interpret digitalization in the same light. It creates value if it supports transparency, conceptual order, and, ultimately, decision quality, because shared definitions and consistent data management make operations learnable and auditable. In this sense, controlling is also an act of translation between organizational language games—finance, operations, and sales speak differently—and its task is to build bridges so that concepts do not slip past each other. Digitalization provides a reliable data backbone for this, while human judgment continues to set the focal point of decisions. Companies in the Prime life-cycle stage per Adizes (2023) are particularly well suited for examination. They are large enough to conduct meaningful controlling and possess sufficient quantity and quality of data, and their operational rhythm is stable enough for persistent patterns to emerge. At the same time, they are not giant multinationals whose controlling systems would be so complex and over-optimized as to burst the bounds of doctoral research and distract from the essential relationships. Thus Prime is not a narrowing but a focus—an aperture through which it is well visible how controlling coheres into a package, how data architectures, metrics, and decision forums build on one another, and where lie the thresholds above which intervention is mandatory. Taking all this into account, I set out the concrete research objectives in four points, with cumulative logic and a mindset that can be tested in the practice of Prime firms.

1. Descriptive identification and conceptual anchoring of the controlling pattern characteristic of the Prime stage. My goal is a coherent descriptive model that can be recognized in practice and referenced consistently.

2. Whether stable, measurable emphasis differences can be demonstrated by cultural sphere based on the actual use of KPIs, and whether these can be applied within a unified, comparable evaluation frame.

3. Development of a performance-evaluation controlling model of practical utility for executives and controllers in the Prime stage. The model should serve as a case-based evaluation framework that helps diagnose and assess one’s own operations along structured criteria.

4. Examination of the role of IT and digitalization in the Prime stage and its conceptual implications. My aim is to explore and present the roles in which IT and digitalization appear in Prime and how their design can be integrated most effectively into successful corporate structures.

1. LITERATURE REVIEW

1.1. Management control systems and the contingency approach

Management control systems form a cumulative logic in which strategy is not a one-off document but becomes a mode of operation composed of conversations, focus, and feedback. In the Levers of Control model, Simons (1995) draws attention to the fact that the same instrument can serve as a discipline-keeping diagnostic frame or as an interactive forum sensitive to strategic uncertainties; the essence lies in the mode of use and managerial rhythm. Otley (1999) complements this by unifying goals, plans, targets, incentives, and feedback with five key questions, thus providing a shared language for day-to-day management. Malmi and Brown (2008) further the package logic by showing that planning, cybernetic, reward, administrative, and cultural elements only achieve their purpose together when they reinforce each other and align with strategy. Ferreira and Otley (2009) widen the horizon by following the process from vision and critical success factors to indicators, forums, and risks, and by asking who is responsible for change. Thus in practice the key is not how many reports are produced but whether forums, indicators, and accountabilities tell a consistent story and jointly serve both learning and discipline (Simons, 1995; Otley, 1999; Malmi & Brown, 2008; Ferreira & Otley, 2009). The contingency approach posits that there is no universally best system; good solutions fit the environment and organizational specifics. Otley (1980) argued early on that the quality of fit determines performance. In my interpretation this means that environmental uncertainty, strategy type, size and structural maturity, and culture jointly set the ratio of interactive to diagnostic use. In turbulent conditions frequent forecasting and non-financial indicators gain prominence; in a prospector orientation a broader set of measures and livelier dialogue sustain experimentation; in a stable defender context strict cost discipline and a standardized closing rhythm provide security. (Otley, 1980; Simons, 1995; Otley, 1999; Malmi & Brown, 2008; Ferreira & Otley, 2009).

1.2. Adizes' life-cycle model

The corporate life-cycle approach proposes that organizational change be understood as a logic of sequential stages rather than isolated events. The classic starting point is Adizes' model, which traces a trajectory from birth to decline with well-recognized turning points (ADIZES, 1979). Its strength lies in making visible how stages entail different goal systems and behavioral patterns, so managerial focus shifts with each stage (RAHIMI –

FALLAH, 2015). Diagnostic value is maximized when critical transitions are identified in time and the organization prepares for the shift (CHEN et al., 2023). Thus the model is not mere description: it provides a shared language for identifying typical problems and intervention points, while warning against the mechanical application of labels (MOSCA et al., 2021). In early stages entrepreneurial intent dominates. Turning toward actual operations requires focus and validation of market needs; absent this, the concept stalls. After founding, in infancy, processes are informal and cash flow often negative due to building infrastructure and markets; success hinges on quickly consolidating the revenue base and liquidity discipline (SILVOLA, 2008). In the go-go period many parallel opportunities can fragment attention; first consistent rules and accountabilities appear to keep growth in check. Adolescence is a turning point as the fast logic of experimentation collides with the need for administrative order. Without delegation and deliberate transfer of decision rights the organization slows; the aim is not over-regulation but the minimal formalization needed for scalability (ZHAO – XIAO, 2019). Prime's sustained competitiveness rests on balancing entrepreneurial energy with disciplined governance; beyond growth, profitability and capital discipline move to the fore (ADIZES, 2004). Best practice in managerial rhythm is a monthly close at T+5–8 workdays and a 9–12-month rolling forecast updated monthly. Daily-weekly alignment is provided by S&OP, with rapid re-forecasting on deviation (HOPE – FRASER, 2003). Performance management hinges on the dual—diagnostic and interactive—use of KPIs; pyramidal logic (corporate → business unit → operations) and combined leading/lagging indicators support learning yet controlled operations (SIMONS, 1995). Governance stands on an approval matrix, clear ownership, and accountability. Management by exception prescribes mandatory escalation above pre-set thresholds and rapid line correction below. Variance analysis traces causes and effects and links to action plans, minimizing surprises and reaction time (HORNGREN et al., 2015). Beyond maturity, stability-centric attitudes can suppress innovation, foster inward focus, and slow responses. Excess formalization brings short-term predictability but mid-term stagnation; inward attention reduces customer sensitivity and market position. Avoiding decline requires dual protection of rhythm and flexibility: institutionalizing external signals, simplifying decision paths, and safeguarding experimentation.

1.3. Controlling and strategic controlling

Controlling is a decision-supporting function aligned to operations, and it creates real value when accountabilities are clear, coordination is regular, and plan–actual comparison and variance analysis are permanent tools of daily and monthly management. Focus lies on goal orientation and forward-looking conclusions: disciplined use of past

data identifies rapid intervention points, while cost orientation concentrates on the true performance drivers (ANTHONY–GOVINDARAJAN, 2006; SÜTŐ, 2017). Exception-based management protects managerial attention with fixed thresholds and escalation; controlling does not merely report but integrates—it aligns goals, decision rights, and feedback into a common frame (SIMONS, 1995; ZÉMAN et al., 2013). Systemically this is a control package, where planning, cybernetic, administrative, incentive, and cultural elements operate coherently (MALMI–BROWN, 2008). Strategic controlling enters where strategy becomes the rhythm of daily operations: a few leading indicators, clear decision thresholds, and a consistent forum cadence create conditions for course correction. Balancing diagnostic and interactive use ensures indicators both signal deviations and frame learning debates; strategic value thus appears in resource allocation as well (SIMONS, 1995; MALMI–BROWN, 2008). Translating strategy into chains of goals, causes, and effects and into linkages between perspectives follows the Balanced Scorecard logic; its strength lies not in a KPI list but in disciplined tracking of hypothesized causal links and operation in tune with decision rhythm (KAPLAN–NORTON, 1996). All this is effective where accountabilities are unambiguous, coordination runs in closed cycles, and controlling holds strategic and operational questions within a single flexible frame (ZÉMAN et al., 2013; ANTHONY–GOVINDARAJAN, 2006).

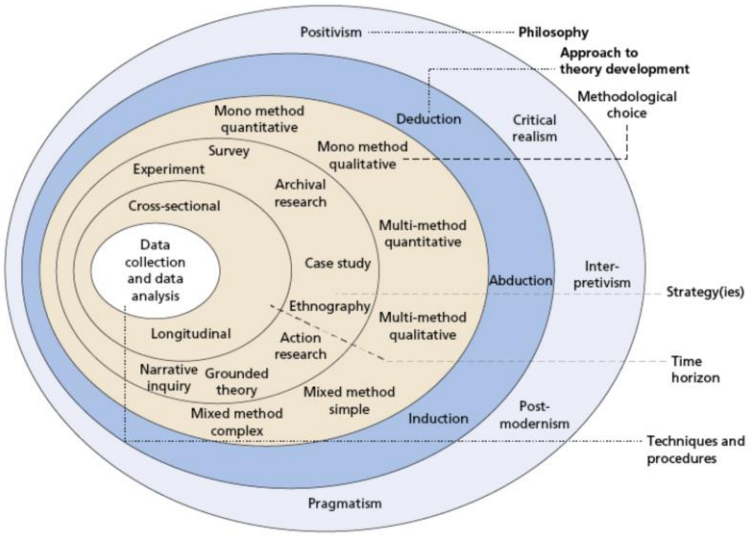
1.4. Cross-cultural controlling

The operation of controlling is strongly shaped by organizational culture: attitudes to rules, decision style, and apportionment of responsibility all bear cultural imprints. According to Hofstede (2001), uncertainty avoidance and power distance indicate the warranted extent of formalization, centralization, and discretion, while the GLOBE study distinguishes between actual practice and desired values, which is echoed in governance choices (HOUSE et al., 2004). Cultural dimensions are therefore starting points rather than prescriptions—industry and firm-specific factors modify them—so sound controlling design calibrates the proportions of formalization, participation, metrics, and subjective assessment to the milieu. Francsovics (2005) distinguishes three broad patterns: the German approach treats controlling as an autonomous management function with strong information and coordination roles and consistent accountabilities; the Anglo-Saxon view draws a narrower scope around management control and managerial accounting, organizing strategy execution and performance measurement; the Japanese practice approaches from production strategy and quality management, embedding process improvement and waste elimination into everyday forums and often interpreting responsibility at group level.

2. MATERIALS AND METHODS

2.1. Methodological approach

I summarize the logic of the Materials and methods section in a dual approach, thereby setting the order: first I outline the full arc of the investigation and the main steps of pattern discovery; then I specify key decisions along the layers of the Research Onion (SAUNDERS et al., 2016).



Source: ©2018 Mark Saunders, Philip Lewis and Adrian Thornhill

Figure 1: The Research Onion
(source: Saunders, 2016)

The model serves not just as an organizing principle; it also cautions that chosen procedures must fit together consistently. Depending on whether a point calls for broader theoretical context or a concrete technical step, I refer in turn to the outer or inner layer. My objective is to identify recurring controlling patterns—independent of industry and cultural sphere—in successful Prime-stage firms per the Adizes model, where stable performance and disciplined governance coexist with preserved flexibility. I am interested in practical manifestations and, building on them, I assemble a proposed controlling package for Prime companies. In an exploratory vein I also examine how differences emerge by cultural sphere and economic sector, while keeping the common

core in view. Sampling follows a stratified, purposive logic: in a 3×4 comparative matrix, rows denote agriculture, industry, and services; columns denote German/broader European, Anglo-Saxon, Japanese, and Hungarian regions; each cell contains one selected company as a case. I retain a separate Hungarian column because insider access and linguistic-cultural embeddedness ease fieldwork and data access. This was a deliberate decision in which the benefits of deeper insight outweigh the risk of bias; accordingly I employ separate validation steps and transparent documentation. Cases are referenced by short codes that combine region and sector (e.g., EP for European agriculture, ASZ for Anglo-Saxon industry, JT for Japanese services, HT for Hungarian services). This notation makes back-referencing fluid while binding every citation to its context. The frame also sets the rhythm of analysis: I regularly project cell-level observations back onto the full matrix to determine whether I am seeing a common core or local specificity.

At the philosophical layer I adopt a pragmatic stance. In the Research Onion this centers on practicality and results-oriented problem solving, coupled with interpretive understanding. I seek the value and applicability of experiential knowledge, identifying viable solutions and generalizable patterns by relying on participants' meaning-making. This starting point ensures conclusions that are valid for the specific situations of the Prime stage and, as a complement to the previous paragraph, it guides choices in data collection and analysis. As Saunders et al. (2016) note, philosophical assumptions can be organized into ontological, epistemological, and axiological dimensions. Within this frame, corporate controlling is a social-science phenomenon where reflexive credibility matters more than the pursuit of full objectivity.

The research approach is abductive—i.e., it is built from the interplay of theory and empirics. I iteratively refine priors by confronting case insights with the literature, yielding a frame that is context-sensitive yet maintains a coherent core. Saunders and co-authors (2016) consider precisely this back-and-forth motion warranted when the phenomenon is complex and multi-level, which I likewise find when seeking to grasp the specific logic of Prime in the changing light of sector and cultural sphere.

Methodologically I opt for a qualitative, multi-method case study. Primary data collection relies on semi-structured expert interviews, complemented by document analysis, available system extracts, reports, and KPI panels. Quantification appears only at the end of evaluation, not additively but as discrete Choquet-based aggregation, which supports transparency and comparability without altering the qualitative backbone. Sampling is stratified and purposive: for each of the 3×4 matrix cells a company is selected per inclusion criteria; Prime status is fixed after pre-screening and confirmed at interview start. Indicators include: stable organizational structure and process maturity; predictable performance from scalable operations; balance of control and flexibility; formalized planning and reporting cadence; sustained positive operational performance; and

maintenance of innovation alongside operational discipline. Selection of cultural spheres is justified by managerial and capitalism traditions. Following Francsovics (2005), I classify by institutional and leadership traditions rather than borders. The relevance of the Hungarian context is also indicated by KSH STADAT gsz0027 data, which show the weight of German, American, and Japanese ultimate control among subsidiaries between 2015 and 2017; it is thus warranted to use the three main cultural spheres in later aggregation (KSH, 2017; FRANCSOVICS, 2005).

The strategy follows a multiple-case replication logic and arranges the experiences of the 12 firms in the 3×4 matrix. Within sectors I seek recurring solutions across cultural spheres (literal replication), while within cultural spheres I look for systematic differences across sectors (theoretical replication). I standardize case structure to preserve comparability, while leaving open sections so that unexpected, context-dependent topics surface. KPI selection narrows to 10–13 indicators per firm under four principles: direct linkage to corporate goals and controlling decisions; assignable intervention thresholds and owners; clear definition and fixed frequency; stable data availability with acceptable data quality. This standardization serves analytical comparability, not uniformity.

The time horizon is cross-sectional. Interviews and accompanying sources were produced between January 2024 and May 2025, i.e., the study offers a snapshot of a relatively short period. Mentions of multi-year performance appear as context descriptions; I do not conduct a system-level longitudinal analysis. I therefore confine conclusions to the period examined; where broader claims arise, I embed them back into the matrix-based comparison and literature, as Saunders et al. (2016) advise for handling the time dimension.

Data collection and analysis interweave. Semi-structured interviews—often in multiple sittings—provided access to actual controlling practice. I complemented these with documents, governance rules, report templates, KPI exports, and dashboard screenshots. Aware of the risks of idealization and image management, I ensured anonymity, employed clarifying follow-ups, and consistently separated declared order from actual practice. To manage data quality and confidentiality I used written agreements and non-identifiable publication; cases are denoted by matrix codes. Analysis applied qualitative methods with codebook-based thematic structuring, followed by identification of patterns emerging from within-case and cross-case comparisons. In interpreting findings I apply analytical generalization—i.e., I describe mechanisms typical of the Prime stage rather than estimate population proportions. As Saunders et al. (2016) argue, consistent philosophical and methodological fit underpins the credibility of qualitative research; likewise, I see this as the guarantee of interpretability for Prime patterns.

Constraints are clear: n equals one per cell. The statements are thus not statistically generalizable; rather, they capture patterns and mechanisms in Prime operation.

Replication logic is literal within sectors and theoretical within regions; I use pattern matching to underpin conclusions. I remain alert to rival explanations—e.g., firm size, ownership, or market maturity—and indicate deviant or negative cases where needed. Sample size was fixed at theoretical saturation: after coding 12 Prime cases and cross-case comparison, no new codes emerged; existing patterns repeated and strengthened; further cases promised no material category expansion. I account for access bias from purposive selection and voluntary participation, which likely over-represents more open and successful organizations; I therefore interpret findings as patterns rather than average formulas. To mitigate single-informant bias I used cross-questioning, occasional supplementary informants, and cross-case comparison. Because controlling is a sensitive area, social expectations and reputational aspects may influence responses; I address this with anonymous publication, open questions, probing for concrete examples, and document-based checks. I also consider risks of terminological differences and translation loss in Anglo-Saxon, European, and Japanese cases; to manage these I begin with shared concept definitions, use brief definitions, and cross-validate interpretations. Accordingly, the dissertation is not representative in the statistical sense; its aim is not hypothesis-testing but model-building description that structures KPI logic and the interrelations of controlling practices, makes boundary conditions visible, and renders practical application refutable along converging evidence lines. Following Saunders et al. (2016), I see this consistent fit as a foundation of qualitative credibility and as a guarantee of interpretability for Prime patterns.

2.2. Methods applied

Binary logic often seems sufficient to describe the world, yet many everyday categories and decision situations show gradual transitions. Accordingly, bivalent truth values and Boolean operations, while convenient, fail where boundaries are not sharp but blurred, as the sorites paradox already illustrates (BOOLE, 1854; HYDE, 1997). Therefore I turn to fuzzy approaches, which, via partial membership and a [0, 1] scale, naturally describe concepts such as high, warm, or acceptable. Per Zadeh (1965), membership functions allow an element to belong to a set not on a yes/no basis but by degree, while logical operations remain interpretable in the realm of gradation.

In this research I apply fuzzy evaluations wherever the dimensions examined are inherently gradual and where methodological consistency requires it. I partition input domains into fuzzy partitions with triangular membership functions, as these are well parameterized, fast to compute, and linguistically easy to interpret for non-mathematical users. The apex lies at the representative value of the category; adjacent sets overlap by roughly half, so the full scale is covered and any point may belong to multiple categories

to different degrees. The use of triangular, trapezoidal, and Gaussian functions follows broad industrial practice, justified not only by convenience but by stable computational background and interpretability (Mendel, 2001; 1995; ROSS, 2010). Ross (2010) supports the advantage of forms describable with few parameters, while Mendel (2001) argues from flexibility and usability. The triangular form is thus a sound compromise for decision-support stability.

At the aggregation level the limits of additive weighting show quickly. The assumption that criteria are independent and unboundedly compensatory often fails, especially when qualitative and quantitative indicators move together or capture the same phenomenon in part. Such situations yield distorted results if we merely compute a weighted sum. I therefore turn to non-additive measures (capacities), where importance is assigned not to individual criteria but to subsets of criteria. Grabisch (1996) sees the strength of this frame in expressing that two aspects together may be worth more than the sum of their separate effects—or, conversely, may be redundant. This shift is not only technical but conceptual: attention moves to the level of groups where interactions actually occur.

Here the Choquet integral enters, aggregating partial values on the basis of capacities in a way that preserves order and co-occurrence information. Zadeh's partial membership values embed naturally in this scheme, so in my use the two models are not parallel but two interlocking elements of the same idea. Beliakov et al. (2007) argue that the bond between fuzzy evaluations and the Choquet integral is particularly strong where synergy or redundancy among criteria can be shown, which my case experience also supports. When, for example, two KPIs are favorable simultaneously, the effect may exceed what an additive sum would suggest; in the case of overlap, overvaluation is a risk. By contrast, the Choquet integral interprets importance at the set level and prevents runaway compensation, yielding a more realistic preference representation in this environment as well (Grabisch, 1996). Thus the interpretability of fuzzy partitions and the capacity-based aggregation form a methodological backbone: the former cleanly translates linguistic scales; the latter preserves relationships among criteria. The result is an interpretable yet faithful aggregation in the KPI context presented in the empirical part, which is why I chose these two models.

3. RESEARCH RESULTS AND THEIR EVALUATION

3.2. Prime Controlling Pattern

Based on the review of the twelve case studies, a unified backbone emerges that is recognizable in every case, though it adapts to the specific context and therefore sounds

different in each. What appears is not a single narrative, but a recurring configuration of motifs.
For cross-comparison, I organized the observations along ten dimensions, and the resulting 12×10 matrix reveals the unique “fingerprint” of each case.

I developed the ten categories myself, as during the interviews and case analyses it became clear that the controlling activities of the examined companies can be best analyzed, understood, and presented along these ten dimensions. The ten categories are as follows:
Closing (T+ rhythm), Planning / Rolling Horizon, Operational Coordination (S&OP / Service Review), Governance / Approval, Action Thresholds (Exception-Based Management), KPI Core, Definitions / Accounting Logic, Variance Management / Review Rhythm, Digitalization / IT Backbone, and Framed Flexibility / Exceptions.

The following table summarizes precisely how these ten examined aspects appear in each of the case studies.

Table 1: Comparison of the 12 Case Studies According to the 10 Examined Aspects

Case	Closing (T+)	Planning / rolling horizon	Operational alignment	Governance / approvals	Action thresholds (method)	KPI core	Definitions / accounting	Variance management / review cadence	Digitalization / IT backbone	Framed flexibility / exceptions
EP	T+6	12+1	weekly S&OP	approval matrix, goal cascade	Published, quantified thresholds, management by exception; owner + escalation; weekly/monthly accountability	Production-quality–sales–cash backbone; standard cost + contribution margin; balanced lead/lag	Unified, governed revenue and cost recognition; standard cost and margin logic; monthly variance analysis	daily shopfloor, weekly S&OP, monthly MBR	SAP S/4 + MES/SCADA + LIMS, BI panels, FEFO, EDI	Seasonal exceptions framed (e.g., heuristic)
ESZ	T+5–7	12 (rolling)	weekly S&OP-like	documented approval scheme	Performance + contribution (inventory/cash/forecast accuracy); closing freeze + mandatory recovery, escalation to CFO; weekly/monthly action follow-up	Unit cost- and efficiency-centric core, forecast accuracy and cash control, cascading	Unified cost and profitability system, standard cost and monthly variance; for volatile inputs financial indexation	weekly operational + monthly P&L/CM review	ERP + BI (unified definitions), closing-freeze controls	Indexed repricing exceptions only with finance leader approval
ET	T+4	10+2	daily NOC → weekly Service Review	no-PO-no-pay, CAB/rate-card	SLA and change thresholds, SEV-1 exception policy, quarterly change-freeze, escalation	Service level–capacity/efficiency–cash (SLA/MTTR–utilization/realization-DSO)	Delivery- or milestone-based revenue recognition; WIP and realization rules; contractual pricing	daily NOC, weekly SR, monthly MBR; quarterly portfolio board	ERP + ITSM/PSA + BI, EU-hosted data lake	SEV-1 exception policy, change-freeze windows
AP	T+5–7	monthly refreshed rolling forecast	weekly operational sync	clarified decision/approval process	Pre-set simple triggers, fast root-cause + line escalation, mandatory recovery plan, weekly/monthly accountability	Revenue potential focus (price–mix), operating metrics as guardrails, cash discipline	Shipment-based revenue recognition; simple, traceable accounting rules; unified target vs actual reconciliation	daily/weekly operational; monthly leadership; quarterly strategic	ERP/reporting base, daily feedback loops embedded in decisions	Flexible re-planning to market signals under disciplined protocols
ASZ	T+6	9+3	weekly S&OP	approval matrix (price/promo/capex)	Trigger-based thresholds system tied to definitions across production–service level–inventory/cash; daily/weekly obeya + catchball escalation	Manufacturing efficiency + service level + inventory/cash; for premium series target bands adjusted for higher margin	Standardized cost and profitability accounting; unified KPI definitions; auditable data lineage	daily line tier, weekly S&OP, monthly P&L	ERP + BI, shopfloor dashboards	Special series: looser OEE band, higher margin; governed
AT	T+5	rolling	weekly–monthly–quarterly rhythm	Anglo-Saxon ownership + some central approvals	Pragmatic %-band thresholding on revenue/GM–capacity–cash; mandatory recovery; "no surprises" escalation	Professional services KPI core: utilization/realization + P&L/CM + cash pipeline (DSO/churn/NRR)	Delivery- and milestone-based revenue recognition; WIP/realization policy; transparent pricing/rate-card rules	weekly operational, monthly MBR, quarterly portfolio	ERP ↔ project tracker ↔ BI; cash-close panels; single source of truth	Some decisions require centralized approval; no-surprises principle
JP	T+6	12+1 + 16-week micro window	weekly agro-S&OP	local line accountability	Pre-regulated buffer steps and water/yield bands; deviations trigger A3 root cause; escalation per ringi	Agri yield/efficiency + animal husbandry + sustainability + logistics/cash; hoshin goal pyramid	Unified costing, plot/herd-level accounting; cold-chain steps with controlled recognition	daily tier, weekly agro-S&OP, monthly MBR; quarterly catchball	ERP + agro/telemetry + BI; alerts; A3/obeya visualization	Buffer steps predefined (e.g., irrigation); ringi/nemawashi approvals
JSZ	T+5–6	12 months (continuous)	weekly S&OP; quarterly catchball; genba/obeya	nemawashi → ringi; hoshin; genba	Standardized thresholds; WIP/OTIF/DSO); owner-deadline–re-measurement; quick corrections	Efficiency–quality–delivery–inventory–cash five; fast intervention	Unified definition handbook; standard cost/variance; itemized, traceable data lineage (MDM)	weekly S&OP; monthly/quarterly hoshin-catchball	ERP + MES/CAQ/LIMS + CMMS + BI; threshold alerts	A3 problem solving, yokoten; disciplined exception handling
JT	T+4	6+6	weekly S&OP; monthly MBR/hansei	ringi matrix; closing freeze; CFO-level exceptions	Fixed closing controls and ringi approvals; inventory/service-level bands aligned to campaigns; actions tied to MBR	Commercial/distribution KPI core: service level–inventory–margin/cash; separate targets for premium line	Shipment-based revenue recognition; price/discount governance; closing lock and exception approvals	weekly operational; monthly MBR	ERP/WMS + BI; digital ringi; central MDM	Closing freeze; premium calibration with governed targets
HP	T+8	9+3 (with mid-month correction)	weekly operational forum	centralized CFO control; unified approval scheme	Few predefined thresholds; management by exception; line corrections + escalation	Production–quality–cash quadrilateral; few simple predefined thresholds	Shipment-based revenue; simple unified cost and variance scheme; few KPIs aligned to actionable accounting	weekly operational; monthly P&L	Agro/animal management + ERP/BI; telemetry; CIP log; EDI	Manual backfills allowed, with later cleanup + accountability
HSZ	T+5–7	12 (quarterly refresh)	weekly S&OP-like	standard-cost system; goals cascaded	Thresholded margin–inventory–COPQ–cash rules; mandatory root cause + action; weekly/monthly follow-up	Margin and inventory discipline + COPQ control + service level + cash	Standard cost and variance analytics; unified definitions; accounting tied to financial and operating targets	weekly/monthly forums	ERP (Infocon) + SharePoint/Excel + internal BSC/COPQ; BI pilot; EDI	Kaizen + visual management; gradual tightening of decentralized labor planning
HT	T+7	12+1	weekly S&OP-like sync	approval matrix for cash/inventory discipline	Service level–inventory–cash thresholds; rapid operational response; escalation to business-unit level	Service level–inventory mix–cash balance; KPI breakdown to warehouse/sales level	Shipment-based revenue recognition; governed handling of price/promo/returns; unified definitions	weekly S&OP-style + monthly close	Navision + Power BI; warehouse ABC/min–max; mobile dashboards	24h delivery target; min–max/ABC policy; fast replanning

Source: Own edition

Although the examined aspects typically appear in different forms in each case study, clear patterns are visible. The closing rhythm is stable in most places in the T+4–8 range, usually T+5–7, with a fixed closing calendar and freeze windows. In planning, a rolling horizon of nine to twelve months is typical, with monthly updates, separate targets and separate outlooks, and rapid reforecasting when needed. Operational coordination runs on a weekly cadence: in manufacturing it is typically S&OP, in service environments a Service Review, where demand, capacity, and inventory or service level are aligned. Governance rests on clarity of decision rights and approval flows, from pricing decisions to investment approvals, with a short escalation path. Action thresholds are predefined and numeric, following the logic of exception-based management, which mandates escalation and a recovery plan for larger variances. The KPI core balances leading and lagging indicators in every case, with cash-proximate indicators, service-level metrics, efficiency and margin measures, and domain add-ons tailored to the industry context. Definitions are uniform, and the accounting logic relies on an auditable data lineage; in manufacturing the typical solution is standard costing and variance analysis, in services WIP and a realization policy. Variance management links the weekly operational forums to the monthly corporate and quarterly executive reviews, closing with consistent action follow-up after root-cause analysis. Digitalization is not an end in itself but an accelerator. Integrated ERP and business intelligence systems form the backbone, complemented—depending on industry—by manufacturing execution, warehouse, or IT service management, while data stewardship and the single source of truth principle ensure a shared language. Flexibility is framed. Exceptions are predefined and traceable; alongside managing seasonal or special situations, executive override may appear in exceptional cases, but it is always transparent and documented.

Based on these patterns, I prepare a synthesized table that arranges the motifs in a single row so the common core of the Prime controlling pattern is clearly outlined. The aim is not to make new claims, but to produce a concise, citable extract of the recorded observations to prepare the next chapter. The synthesis was not performed using a mathematical method (e.g., mean or mode) but on a consistency basis. That is, the deciding factor was not how often an element occurred, but that these elements were observed across the case studies with consistently similar interpretations, cadences, and definitions. Thus, the synthesized table is not an average, but a distillation of durable, interlocking elements.

Table 2: Synthesized Prime Controlling Pattern

Closing (T+)	Planning / Rolling horizon	Operational alignment	Governance / approvals	Action thresholds (method)	KPI core	Definitions / accounting	Variance management / review cadence	Digitalization / IT backbone	Framed flexibility / exceptions
On-time month-end closing cycle – typically T+4–8.	Rolling forecast over 9–12 months, typically with monthly refresh and reforecast as needed.	Regular (usually weekly) S&OP / Service Review, often with daily shop-floor/stand-up support.	Documented approval matrix and responsibility framework.	Pre-set numeric bands and triggers, followed by mandatory escalation and a recovery plan.	Lead–lag balance: domain KPIs tailored to the context.	Unified definitions and a single source of truth, auditable data lineage and MDM.	Weekly operations + monthly MBR + quarterly QBR/strategy forum; causal variance analysis and action tracking.	Integrated ERP + BI.	Pre-defined, governed exceptions.

Source: Own edition

As a result of the summary, it can be read out that the T+ rhythm of closing falls between T+4 and T+8 in most places. In practice this means monthly reporting is tied to a predictable calendar, the chance of surprises decreases, and the materials for leadership forums converge with operational reality. In planning, the outlook generally spans 9 to 12 months on a rolling basis, with monthly updates and re-forecasts as needed. Continuing from this, operational coordination runs on a weekly cadence: S&OP in manufacturing, Service Review in services, in many places supported by daily shopfloor or stand-up meetings. Here demand, capacity, and inventory or service level are aligned, and here it is decided whether a rapid re-forecast is required.

Governance stands on a documented approval matrix and clear accountability, which provides a short escalation path from price and promotion-type decisions to investment stage-gates. Action thresholds are predefined numeric bands. When a variance crosses these, escalation is mandatory and a recovery plan is launched. I consider this the central element of exception-based management, because it simultaneously protects discipline and leaves room for line decisions.

The KPI core is built on the balance of leading and lagging indicators. Cash-proximate signals, service-level metrics, efficiency and margin measures form the base, with domain-specific add-ons varying by industry. Definitions and accounting logic are uniform. They follow the single source of truth principle with an auditable data lineage and MDM practice; in manufacturing, standard costing and variance analysis are common, while in services, WIP and a realization policy prevail. Variance management links the weekly operational forums to the monthly MBR and the quarterly QBR, with causal variance analysis and action tracking tied to owners and deadlines.

In line with this, digitalization is not an end in itself but the backbone that supports the operating cadence. Integrated ERP and BI provide the foundation, complemented—depending on industry—by, for example, MES or WMS solutions, and in IT service environments by ITSM tools. Finally, flexibility is framed. Exceptions are pre-regulated and measurable in hindsight. If the situation requires it, executive override is possible, but it occurs transparently and in a documented way. Augmenting the observations of the

previous chapter, this yields the common core I refer to as the Prime controlling pattern. I present a detailed interpretation of the results in the Conclusions and Recommendations chapter.

3.3. Cultural emphases

I then analyze the picture that emerges from the twelve case studies from the perspective of KPIs. I do not compile a list of tools; instead I record how decisions are organized in practice. I arranged the indicators into four stable categories: revenue-focused signals, cost- and margin-related indicators, process and efficiency metrics linked to lean logic, and IT indicators. This fourfold breakdown is not dictated by the literature but unfolded from case experience. The recurring pattern in leadership forums is that debates and decisions consistently organize around these four poles: the rhythm of the market and realized revenue; margin and cost discipline; lead times and process quality; and the systems that ensure data lineage. I consider this structure suitable because it is broad enough to accommodate different industry solutions and narrow enough to prevent decision logics from blending.

For the classification I assigned each KPI exactly one primary category and, where justified, also marked a secondary link. I set the weights accordingly: if there is a secondary, the primary receives 0.8 and the secondary 0.2; if there is no secondary, the primary weight is 1.0. This deliberately follows a simple Pareto-style weighting logic, which is appropriate here because it records the actual dominance of the main driver while making the secondary relationship visible without overriding the primary character. This keeps the within-case proportion profile comparable and traceable, and KPI baskets of different sizes remain cleanly comparable. Naturally this is a certain level of simplification of real proportions, but for research hygiene and transparency of results I consider it the right decision here. In practice the method could be refined with individual weights or even non-additive aggregation, but that lies beyond the scope of this study.

Accordingly, I classified all KPIs from all case studies into the four named categories. I then create the 12×4 proportion matrix, which shows, for each case study, the frequency-based weight of the four categories.

Table 3: 12×4 proportion matrix

	Revenue	Cost	Lean	IT
EP	6.15%	50.77%	38.46%	4.62%
ESZ	30.77%	30.77%	23.08%	15.38%
ET	12.31%	38.46%	29.23%	20.00%
AP	40.00%	20.00%	33.85%	6.15%
ASZ	47.27%	7.27%	40.00%	5.45%
AT	60.00%	5.00%	21.67%	13.33%
JP	7.27%	18.18%	63.64%	10.91%
JSZ	6.67%	21.67%	70.00%	1.67%
JT	16.00%	10.00%	68.00%	6.00%
HP	6.15%	40.00%	49.23%	4.62%
HSZ	32.00%	34.00%	26.00%	8.00%
HT	26.67%	43.33%	26.67%	3.33%

Source: Own edition

In the next step, I averaged the proportion rows by cultural area over the three cases per area. The averaging is arithmetic, since the rows are normalized, the per-cell sample size is identical, and the aim here is exploratory comparison. The resulting 4×4 table shows the centers of the cultural profiles. Based on the numbers, revenue orientation is strongest in the Anglo-Saxon context, cost discipline stands out in the European sample, lean logic carries the weight in the Japanese cases, and the Hungarian profile aligns neatly with the European picture. The table is illustrated below in percentage form.

Table 4: Cultural-area average proportions

	Revenue	Costs	Lean	IT
European (E)	16.41%	40.00%	30.26%	13.33%
Anglo-Saxon (A)	49.09%	10.76%	31.84%	8.31%
Japanese (J)	9.98%	16.62%	67.21%	6.19%
Hungarian (H)	21.61%	39.11%	33.97%	5.32%

Source: Own edition

To enable linguistic comparison of the weights, I scale the percentage ratios to the 0–1 interval with the following function: $x' = \min\left(\frac{x}{L}, 1\right)$, where $L = 0.7$. I take 0.7 as the ceiling because the highest value in the sample was 67.21% for the lean category in the Japanese cases, so all data ranged between 0 and 70%. The transformation is monotonic and ratio-preserving; order and relative distances remain, and the proportion profiles of different baskets are placed on a common scale.

For linguistic interpretation I use four triangular membership functions: $\mu_i(x') = \max(0, 1 - \frac{|x' - c_i|}{h})$, where $c_i \in \{0.125, 0.375, 0.625, 0.875\}$; the peaks are equally spaced, $h = 0.25$. This yields 0.5 overlap midway between neighboring peaks, 1 at the peaks, and 0 at the neighboring peaks, i.e., transitions between categories are smooth. I chose four categories because I also tried three and five; with three levels, separations disappeared, and with five the picture became fragmented and blurry. With four equally spaced peaks, the emphases are clear while labels remain stable even under minor data fluctuations. I present the fuzzy method in detail in the methodology chapter; here I record the application steps and the resulting interpretation. Based on the above, the functions take the following form:

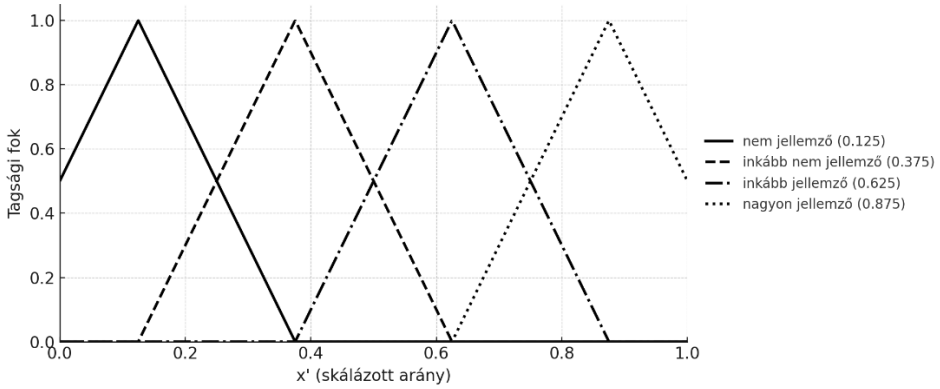


Figure 2: Cultural-area emphasis fuzzy membership functions

Source: Own edition

Based on the scaling and membership functions, I assigned the most fitting linguistic label to every cultural-area–category cell, illustrated in the figure below:

Table 5: Cultural-area emphases with linguistic variables

	Revenue	**Costs**	**Lean**	**IT**
Anglo-Saxon (A)	somewhat characteristic	not characteristic	somewhat uncharacteristic	not characteristic
European (E)	not characteristic	somewhat characteristic	somewhat uncharacteristic	not characteristic
Japanese (J)	not characteristic	not characteristic	highly characteristic	not characteristic
Hungarian (H)	somewhat uncharacteristic	somewhat characteristic	somewhat uncharacteristic	not characteristic

Source: Own edition

I then visualize the resulting table on a heatmap:

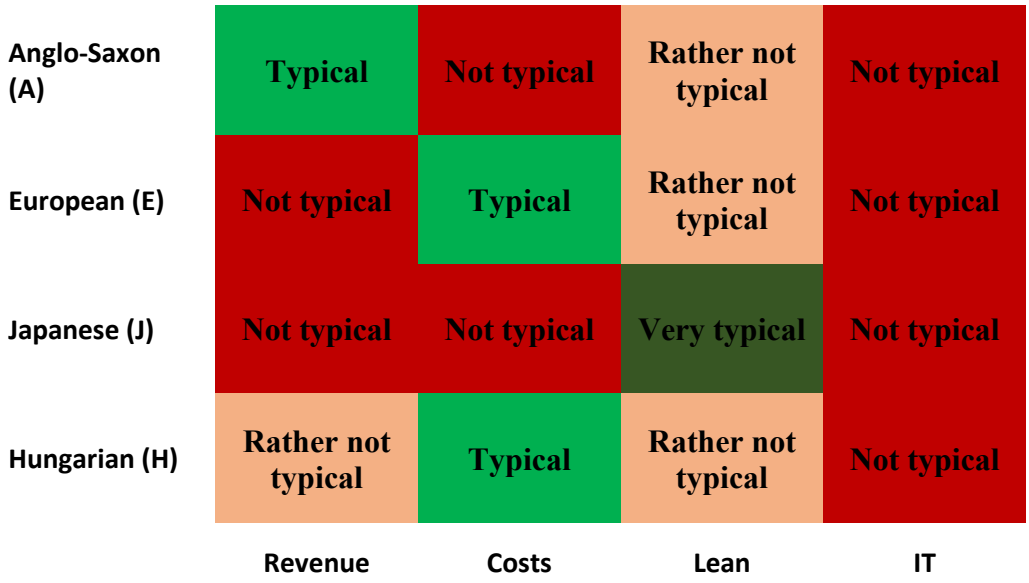


Figure 3: Heatmap of cultural-area KPI emphases

Source: Own edition

The table and the corresponding heatmap show clearly which category is most emphasized in each cultural area. In the Anglo-Saxon context it is revenue; for European companies it is cost; in the Japanese sample it is lean. For Hungarian companies, cost-type indicators also dominate, which aligns well with the literature that does not treat Hungarian companies as a separate cultural area but assigns them to the European type.

3.4. Choquet-integral-based performance evaluation model

The differing emphases established in the previous chapter mean that organizations operating in different cultural areas consistently consider different interventions appropriate. The Anglo-Saxon approach prioritizes developing the revenue side, the European environment puts spending control first, and the Japanese samples see the key in process optimization. Since Hungary is not an independent cultural area but part of the European one, at this stage of the analysis I no longer treat it as a separate category. This is important not merely to offer comparisons, but because my aim is to derive from the

description a concrete method usable in everyday decisions. The next step of the research is therefore to design an aggregating procedure that, based on plan–actual deviations across the four KPI dimensions, rates on a linguistic scale the extent to which the performance examined fits the established practice of the given cultural area. To justify this I chose the Choquet integral. The Choquet logic brings interactions into the calculation through a capacity function, so the weight of subsets is formed not only from the sum of their members, but from the actual significance of the combination.

The next question is how to obtain a set of weights that fits corporate reality. A single organization's perspective is insufficient, because the second result showed that emphases differ by cultural area. I therefore rely on external expert judgments and collected responses from three experts per cultural area.

Accordingly, using questionnaires I involved three experts per cultural area, one from each company examined, who thus represented their own cultural area. I sent the questionnaire months after the interviews and provided only the most necessary context, so that the answers would be as unbiased yet relevant as possible. In the questionnaires I used a five-point linguistic scale ("not significant," "rather not significant," "rather significant," "significant," "very significant") to assess the importance of each dimension and their combinations. I aggregate the values not by simple averaging, but by frequency-based consensus (mode). Where the mode is not identifiable, I use the midpoint. In line with the Choquet logic, the questionnaire asks for expert opinions in 14 cases (four singletons, six pairs, and four triples) for the four categories.

Both in the patterns of completion and in the patterns of the aggregated columns obtained with the above method, the cultural emphases named in Chapter 2 are clearly observable. However, in accordance with Choquet logic these now possess not only mutual relations in themselves, but also expert-assigned significance in every combination. For further calculations I must quantify these linguistic ratings in their present form. I perform this transformation on the [0,1] scale according to the following rules. "Not significant" elements get 0.0, "rather not significant" 0.25, "rather significant" 0.5, "significant" 0.75, and "very significant" the maximum 1.0. I project the evaluation onto the [0,1] scale because in Choquet-based aggregation the expert judgments appear as capacities (μ), where by axiom $\mu(\emptyset) = 0$, $\mu(U) = 1$, and monotonicity holds ($A \subseteq B \Rightarrow \mu(A) \leq \mu(B)$). The [0,1] domain is a model requirement that provides a uniform scale for comparing KPIs and cultural areas and facilitates later monotonicity checks and the fuzzy interpretation of the output. I use equal step sizes in the mapping because the five-level rating is ordinal; with a small expert sample there is no reliable information on the latent distances between levels. Equal-distance coding preserves the relative structure of expert rankings, avoids false precision, and ensures that building subset capacities and the non-additive (synergy/redundancy-handling) Choquet logic remain transparent and stable. The values obtained in this way are the aggregated expert target values.

In the next step, I convert the values coded between 0 and 1 from the linguistic scale into a **monotone capacity** (μ), since the Choquet integral is well-defined and interpretable only under this condition. First, the boundary conditions must hold ($\mu(\emptyset) = 0, \mu(U) = 1$). Second, it is a structural requirement that if $A \subseteq B$, then $\mu(A) \leq \mu(B)$; otherwise one could obtain the contradictory situation that two dimensions together are less important than either alone, distorting the interpretation of non-additive effects and the order-dependent weighting of partial sums. Methodologically, for each cultural area I first record raw capacities from the expert judgments for every included subset (singletons, pairs, triples), fix the boundaries ($\mu(\emptyset) = 0, \mu(U) = 1$) then perform monotonization with minimal intervention: for every set B, $\mu'(B) = \max\{\mu(B), \max_{A \subset B} \mu(A)\}$i.e., I correct only upward by the minimal amount needed to restore order (thus preserving expert information and not penalizing higher-rated subsets). I run the correction in increasing order of subset size so that reference values are already consistent for smaller sets. Finally, if for any cultural area the obtained $\mu'(U)$differs from 1, I restore the unit value with a one-step normalization ($\mu''(S) = \mu'(S)/\mu'(U)$), so capacities remain comparable across cultural areas and the Choquet aggregation rests on a stable, contradiction-free basis. The table containing the monotonized μvalues is thus as follows:

Table 6: Monotonized μvalues

	ANG_μ monotonic	EUR_μ monotonic	JAP_μ monotonic
∅	0	0	0
Revenue	1	0.5	0.25
Cost	0.5	1	0.5
Lean	0.25	0.75	1
IT	0.5	0.5	0.75
Revenue + Cost	1	1	0.75
Revenue + Lean	1	0.75	1
Revenue + IT	1	0.5	0.75
Cost + Lean	0.5	1	1
IT + Cost	0.5	1	0.75
IT + Lean	0.5	0.75	1
Revenue + Cost + Lean	1	1	1
Revenue + IT + Cost	1	1	0.75
Revenue + IT + Lean	1	0.75	1
IT + Cost + Lean	0.5	1	1
Revenue + Cost + Lean + IT	1	1	1

Source: Own edition

In the next steps, using the monotone μtable compiled per cultural area, I produce a case-dependent Choquet aggregation. I sort the four standard numbers (SN) in descending order and generate all $4! = 24$possible orders. For each I write the top-k chain of sets and assign the corresponding capacities, then compute the aggregate value with the piecewise formula. I handle ties with a fixed rule or by row merging, and finally arrange the result into a relation table. By SN I mean the standard, direction-corrected relative indicator derived from plan/actual variance.

Since the weight system of the Choquet integral depends on the actual ranking (not on a fixed, additive weight vector), I sort the SNs in descending order, then list all strictly decreasing permutations $(4! = 24)$so that a "formula catalog" exists in advance for any specific situation. Because the marginal contribution is always relative to the context already included in the set, for each order I write the top-k chain $S_1 \subset S_2 \subset S_3 \subset S_4$and, from the cultural-area-specific monotone μ table, directly assign the capacities $\mu(S_1), \mu(S_2), \mu(S_3), \mu(S_4)$. To use a uniform computation form, I apply the same piecewise formula in all cases:

$$C = \sum_{k=1}^{4} (SN_{(k)} - SN_{(k+1)}) \cdot \mu(S_k), SN_{(5)} = 0,$$

where C is the output index of the Choquet integral, i.e., the joint, non-additive aggregation of the four SNs under the monotone capacity $\mu$of the given cultural area. This is easy to illustrate with an example: Let $SN_{\text{Revenue}} = 0.80$, $SN_{\text{Cost}} = 0.60$, $SN_{\text{Lean}} = 0.70$, $SN_{\text{IT}} = 0.30$. The order is: Rev ≥ Lean ≥ Cost ≥ IT. Substituting into the formula gives:

Anglo-Saxon: μ: (1, 1, 1, 1):

$$C = (0.80 - 0.70) \cdot 1 + (0.70 - 0.60) \cdot 1 + (0.60 - 0.30) \cdot 1 + 0.30 \cdot 1 = 0.80$$

European μ: (0.5, 0.75, 1, 1):

$$C = (0.80 - 0.70) \cdot 0.5 + (0.70 - 0.60) \cdot 0.75 + (0.60 - 0.30) \cdot 1 + 0.30 \cdot 1 = 0.725.$$

Japanese μ: (0.25, 1, 1, 1):

$$C = (0.80 - 0.70) \cdot 0.25 + (0.70 - 0.60) \cdot 1 + (0.60 - 0.30) \cdot 1 + 0.30 \cdot 1 = 0.725.$$

Thus, for the same SN profile the three different capacity systems (cultural areas) yield different scores, because the Anglo-Saxon $\mu = (1,1,1,1)$fully carries forward the effect of the largest component (0.80), while the European (0.5,0.75,1,1) and Japanese $(0.25,1,1,1)$profiles hold back the marginal contribution in the first step, so the score drops to 0.725.

Continuing the original line of thought, only the genuine surplus is carried forward, always with the appropriate context-dependent weight. Since ties may occur in the ordering ($SN_{(k)} = SN_{(k+1)}$), such cases do not affect the computation: because ($SN_{(k)} - SN_{(k+1)}) = 0$, the given term drops out automatically. I then apply a deterministic tie-breaking priority (e.g., Revenue > IT > Cost > Lean) and select the row compatible with the priority from the 24. As the μprofile differs by cultural area, each area ultimately yields a 24-row relation table. On the left is the ordering condition (e.g., Revenue ≥ IT ≥ Cost ≥ Lean), in the middle the corresponding Choquet formula (with the $S_k$sets for that order), and on the right the μvalues valid for the cultural area ($\mu(S_1) \dots \mu(S_4)$). This structure simultaneously makes the non-additive pattern arising from cultural specifics visible and provides a mechanical, reproducible procedure that can be applied immediately to any specific SN vector. The result is 3(per cultural area) × 24relations.

The relation tables provide the different scenarios by cultural area. Each row corresponds to a specific SN ranking and states which top-k sets $S_1 \subset S_2 \subset S_3 \subset S_4$belong to that order and which capacity values $\mu(S_1), \mu(S_2), \mu(S_3), \mu(S_4)$ enter the piecewise aggregation. Interpreting the tables is therefore relatively simple: select the row matching the current SN order, which simultaneously identifies which pairs and triples take effect together in that cultural context, thereby making synergy visible (when a combination is worth more than the sum of its parts) and redundancy visible (when the joint effect is smaller due to overlap). Since capacities differ by cultural area, the same SN constellation can yield different relational patterns and weight systems, which is a substantive imprint of cultural specifics. In the event of a tie, the corresponding aggregation term drops out because the difference is zero, so it suffices to choose the compatible row with fixed priority, as the output remains independent of the tie order. Overall, the relation tables ensure that any SN situation can be converted into a non-additive aggregate value in a culturally sensitive yet mechanical and reproducible way.

In the next step, I map the value $C_\mu \in [0,1]$obtained from the Choquet integral to a fuzzy linguistic scale, because a single number alone gives little information for managerial interpretation: it does not reveal whether the given performance should be considered weak, acceptable, or outstanding relative to the cultural-area-specific standard. The goal of the fuzzy translation is to turn the continuous index into well-communicable yet nuanced fit levels while preserving the information content of the non-additive aggregation. I use five categories, as this resolution is detailed enough to sense practical thresholds, does not overload the scale, and aligns with the previously used five-level rating logic; equal spacing of 0.2 provides a parsimonious and cross-cultural, comparable partition. The chosen linguistic variables make the meaning of fit explicit: Very weak fit – Weak fit – Medium fit – Strong fit – Excellent fit. Mathematically I define each category with a triangular membership function in equal placement: centers $c = \{0{,}10;\ 0{,}30;\ 0{,}50;\ 0{,}70;\ 0{,}90\}$, width $h = 0.20$, and for every $j \in \{1, \dots, 5\}$

$$\mu_j(x) = \max\,(0{,}1 - \frac{|\,x - c_j\,|}{h})(x \in [0{,}1]),$$

with the outer triangles truncated at the boundaries and overlaps ensuring gradation. The functions thus take the following shape:

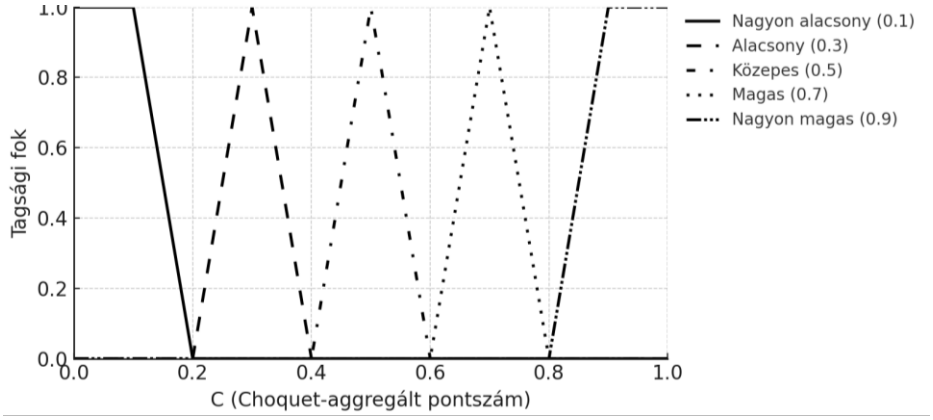


Figure 4: Fuzzy functions for the Choquet-based aggregation

Source: Own edition

By the end of this line of reasoning I have assembled a Choquet-based evaluation model parameterized by cultural area that assigns capacity weights to the four KPI categories and their combinations, thereby handling interactions quantitatively (synergy and redundancy). Organized into relation tables, the model records the formula and weights for the 24 possible SN rankings, so a clear, reproducible computation can be performed in any specific situation. The result of the aggregation is a continuous index ($C_\mu \in [0{,}1]$)that shows the extent to which a company's KPI set fits the standard of the selected cultural area. The fixed fuzzy functions translate this index into a five-level linguistic profile, so the outcome remains both communicable and nuanced. The practical purpose of the system is to turn the cultural differences described earlier into a working score, allowing the performance of any Prime organization to be computed and compared with the same procedure, using cultural-area-specific weighting

3.5. Examining digitalization in the Prime controlling pattern

In my research I found that IT is not a separate objective system but a background force that accelerates and makes reliable the operating backbone on which controlling in the Prime stage is built. This backbone consists of the monthly cycle that closes on time in a T+ scheme, rolling forecasting, threshold-based variance management, weekly and

monthly forum cadence, and unified definitions and master-data discipline. IT adds a stable data lineage and automated alerts, as well as a unified semantic space, so attention remains focused on operational and financial goals rather than shifting into technological self-purpose; IT stays in a supporting role.

The quantitative summary of case evidence supports this picture. After classifying the case-study KPIs into the now-familiar four categories, IT appeared as a **primary** category in only four indicators out of the twelve cases, i.e., 2.8%. As a **secondary** label, however, it was present in forty-two indicators, i.e., 29.4%. The summary table is shown below:

Table 7: IT presence among the four categories

Case	Total KPI	IT primary (pcs)	IT secondary (pcs)	IT presence
AP	13	0	4	Yes
ASZ	11	0	3	Yes
AT	12	1	3	Yes
EP	13	0	3	Yes
ESZ	13	1	5	Yes
ET	13	2	5	Yes
HP	13	0	3	Yes
HSZ	10	0	4	Yes
HT	12	0	2	Yes
JP	11	0	3	Yes
JSZ	12	0	1	Yes
JT	10	0	3	Yes

Source: Own edition

There is no case where IT does not appear at least as a secondary category, so its presence and role are unquestionable, yet the center of gravity remains on the revenue, cost, and lean axes. This can be observed in production, services, and agriculture alike. This also makes it clear that digitalization does not build a separate layer above performance management; rather, it makes the existing backbone faster and more reliable.

As a complement to the above, the background character also becomes visible across operating layers. In diagnostic use, unified definitions, SSOT and MDM practices, data-quality checks, and automated alerts shorten closing and reforecast cycles and reduce interpretation noise, i.e., one number belongs to one definition. In interactive use, weekly S&OP and Service Review, monthly MBR, and quarterly QBR provide the debating arena where dashboards and cross-views direct attention to assumptions and real trade-

offs, not to data scrubbing. When the two layers interlock, IT's contribution is visible yet remains instrumental, because it supports the achievement of financial and operational goals. In keeping with the logic of the thesis as a whole, I interpret digitalization as an accompanying question. I do not conduct a standalone technology assessment; I show where and how digital tools support the controlling solutions identified in the Prime environment. Thus the focus of the investigation remains on Prime patterns, with digitalization helping their reliable and rapid use.

This interpretation also fits the objectives of the dissertation, since I interpret the role of digitalization in operating the Prime pattern rather than building a separate digital KPI set. The results point to the conclusion that technological presence is valuable when it keeps both the diagnostic backbone and the interactive debating arena alive, while the focus of performance evaluation remains on operational and financial goals.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Prime controlling pattern

The picture that emerges from the cross-case analysis clearly echoes Adizes's Prime logic. The essence of Prime is that the company keeps creative entrepreneurial energy and formalized control in balance. Growth alone no longer suffices; emphasis shifts to predictable performance and capital discipline. The literature supports this across multiple sources, and I see in it the theoretical bridge to the pattern I present. The 12×10 matrix and the 1×10 shared statement set do not list tools; they reveal a way of operating. The monthly cycle that closes on time, the nine-to-twelve-month rolling forecast, the weekly operational forum, and documented accountability together form the Prime backbone. Definition discipline and an auditable data lineage mean in practice that conversations can rest on a shared language, while thresholds and escalation prevent variances from staying on the agenda without action. This coherent package is exactly the compromise Prime requires.

Foundational works on managerial control point in the same direction. Simons (1995) argues that control is "alive" when diagnostic and interactive use are present simultaneously, i.e., when the organization can maintain discipline while keeping strategic uncertainties in managerial view. In Simons's reading this is not about the number of tools but about how they are used. From this perspective, in my synthesis the monthly close and variance analytics form the diagnostic backbone, while the weekly operational alignment and reforecast entry rules create the interactive arena. Ferreira and Otley (2009) emphasize that the system's meaning lies in steering change. In my research

this appears as forum cadence plus management by exception, which together ensure quick correction and prevent decision responsibilities from fragmenting. Malmi and Brown interpret control as a package, meaning the quality of the combination is decisive. From this angle the ten elements are not boxes placed side by side but meshing gears. The rolling-forecast rhythm only has value if S&OP, monthly and quarterly reviews, thresholds, and definition discipline tell the same story.

Prime's imprint is most visible in three points across the examined cases. First, temporality: the T+ rhythm and the nine-to-twelve-month rolling horizon serve to avoid surprises. The point is not only that closing is fast, but that the monthly close and forum materials converge with reality, so executive conversation becomes an actual intervention space rather than a retrospective explanation. Second, the exception logic: thresholds and escalation are not decorative bureaucracy but gates that determine when line decisions must give way to executive attention. Third, a unified language: SSOT and auditable data lineage ensure that forums do not revolve around definitional disputes but focus on true cause and effect. The digital data environment also compels renewal in management accounting methods, especially in redesigning data lineages and reporting semantics (Bhimani, 2020).

Adizes describes Prime's crisis as the drift of complacency. The official institute description likewise stresses that Prime requires continuous balancing to sustain the "fountain of youth" (Adizes Institute, 2023). Well-functioning rules can become ends in themselves, focus turns inward, and coordination grows cumbersome. Its extreme form is when control no longer serves performance but becomes an obstacle. Traces of this risk appear in my research wherever forum cadence exists but variance remains on the agenda without action. System-dynamics studies suggest that early-stage PAEI profiles foreshadow later balance problems and intervention points (Mowlanapour et al., 2020). I see this as a key issue in Prime: the goal is not to bolt on even more control, but to connect the control package to decision rhythms so variance turns into action assigned to an owner and a deadline. The literature frames this as the dual logic of diagnostic and interactive use and argues control should be designed as a package.

Translated into controlling practice, the response to the Prime crisis appears as follows: the on-time monthly cycle and rolling forecast keep the diagnostic backbone tight, narrowing the room for surprises. The weekly operational alignment and reforecast-as-needed operate the interactive arena, so strategic uncertainties remain in sight. Numeric thresholds and escalation are the gates of actionability, because a variance cannot remain a mere agenda item. Definition and MDM discipline guarantee a shared language, so forum debates do not stall on number interpretation. The KPI core rests on a balance of leading and lagging indicators, so signaling and feedback measurement do not clash. The digital backbone is not an end in itself; it accelerates. Integrated ERP and BI, industry extensions, and automated alerts support the conversion of thresholds into real

interventions. This translation shows that, in Prime, controlling not only measures but also maintains decision cadence in responding to crisis.

Accordingly, my research yields two scientifically supportable claims. First, the common denominator across the twelve cases is indeed a specific Prime controlling pattern. I am not speaking about a single method but a ten-element configuration whose components reinforce one another. Second, in the Prime environment controlling can turn crisis responses into an operating order. Against the risk of red tape, the duo of diagnostic backbone and interactive debating arena provides the antidote. Here this dual structure rests on the T+ rhythm and rolling forecast, weekly and monthly executive forums, thresholds and escalation, and unified definition and data-management discipline. Thus controlling does not ossify but helps maintain motion.

4.2. Cultural emphases

The essence of the cultural-area analysis is that the KPI portfolio is not merely a list of metrics but a map of managerial attention. I built the classification bottom-up. I did not force a predefined typology on companies; I recorded which categories debates and decisions actually organize around in practice. Hence the four poles—revenue, cost, lean, and IT—are categories around which decisions truly cluster. Starting from primary and, where appropriate, secondary labeling, each indicator received a single main focus, then combined into case-level proportions. From these I built the proportion matrix covering the twelve cases, averaged it by cultural area, then brought it onto a common scale and attached linguistic labels. Normalized comparison and interpretation via triangular membership functions provide control over the numbers so differences appear not as measurement noise but as stable focus shifts.

The resulting picture is coherent and unambiguous. In the Anglo-Saxon context, discussions gravitate toward market logic, with revenue signals most salient. In the European sample, indicators organized around cost and margin dominate. In the Japanese cases, lean represents the natural orientation, with process quality, lead time, and consistent execution steering decisions. The Hungarian profile does not draw a distinct fourth character but follows the European picture, tilting toward cost-type indicators. These claims are demonstrably present in the analysis. The methodological path starts from primary and secondary labeling, organizes the proportions of the twelve cases into a unified system, translates cultural-area averages to a common scale, and assigns linguistically stable labels to the percentages. Thus KPI baskets of different sizes become comparable, and it becomes transparent that the baseline tone of managerial attention differs by cultural area.

The practical implication is clear. Setting the Prime backbone alone is not enough. The KPI language should be tuned by cultural area, while ensuring all four poles retain minimum visibility. In the Anglo-Saxon environment it is appropriate for revenue and customer-proximate signals to be more prominent, while threshold and escalation rules must be anchored in the balance of leading and lagging indicators so growth momentum does not wash out margin and the cash cycle. In the European picture, the language of cost and margin is strong. Here, leading signals and service-level metrics provide counterweight so forums do not lock into cost topics alone. In the Japanese sample the lean focus is so pronounced that the risk is delayed financial visibility. At this point unified definitions and master-data discipline are the bridge pulling cash-proximate signals and the operational world together. In the Hungarian examples this order pairs with practical operation, seeking stability through the cost focus in line with the European profile. I therefore recommend that leaders design the goal hierarchy, intervention thresholds, and forum agendas so that the cultural area's baseline tone intentionally echoes through, while all four poles are present and measurable.

4.3. Choquet-integral-based performance evaluation model

I carried the Prime controlling pattern and the cultural emphases established in previous chapters forward with expert validation and discrete Choquet-based aggregation so that qualitative descriptions of differences translate into reproducible, computation-based ratings. The starting point remains the same four KPI dimensions (revenue, cost, lean, IT), which, per the cultural-area evidence presented earlier, receive different weights. Expert validation confirmed these differences, so I organized the descriptive picture into a working evaluation model. Performance is determined strictly along these four dimensions. The basis is not balanced scorecard perspectives, market value, or other external indices, but the company's own plan–actual deviations tied to these dimensions.

I created a generally applicable model that evaluates the performance of companies in the Prime life stage from a controlling perspective. Using the discrete Choquet integral, computed from the company's own KPI plan–actual deviations, the model determines a performance score. I convert this score into a five-level fuzzy linguistic rating to make the result directly interpretable. In determining weight values the model also takes into account the characteristics of the chosen cultural area. Beyond evaluation, the model highlights problem areas and thereby indicates directions for intervention.

I also captured the differing emphases via expert questionnaires. In them, experts provided linguistic ratings of the importance of the four KPIs and their pairwise combinations. I mapped these to [0,1] with equal steps and used them as capacities (μ) in

the Choquet calculation, so the cultural-area capacity tables directly carry the expert patterns and guide weighting. Considering cultural area is not a bolt-on but a condition of usability. I found that different cultural areas respond differently to the same situation because emphases differ: in many European contexts the joint improvement of cost and lean is decisive; Anglo-Saxon practice relies more on strengthening the revenue side; the Japanese approach chooses process improvement first. Without splitting the model by cultural area, decision logics would blur, weights would distort, and the same KPI profile would receive conflicting interpretations. Cultural-area-calibrated weights handle this heterogeneity in an orderly way, so the score is always readable within the selected context.

It is important that the model evaluates the company's own performance. Inputs come from the company's plan–actual deviations, so the result does not reference an external standard but describes the current state of operations. Converting the score into a linguistic rating enables consistent communication, while analyzing component-wise and combination contributions shows where problems arise. This diagnosis indicates intervention directions and establishes the basis for time-series self-measurement as well, because under the same cultural area and SN rules, later recomputation measures actual movement.

In practice, the company collects plan–actual deviations per the defined KPI system, fits the case into the chosen cultural-area framework, then computes the discrete Choquet integral from the capacity tables. The resulting value is immediately translated by the five-level fuzzy scale into an interpretable linguistic rating, while the contributions and relation tables reveal which KPIs and combinations pull performance down. Intervention directions can then be clearly identified.

In summary, the model converts qualitative patterns into quantitative evaluation while incorporating cultural differences in a manageable way. This ensures that the same measurement procedure remains valid across contexts and, for decision support, identifies concrete intervention points and trackable directions of change.

4.4. Examining digitalization in the Prime controlling pattern

The novelty of this dissertation's examination of digitalization is that I consistently interpret IT as a background enabler within the Prime framework, not as a standalone objective system. It is present everywhere, yet it does not hold operations together as a primary KPI; rather, it makes the diagnostic and interactive layers faster, more accurate, and more reliable. Empirical counting clearly supports this: of the 143 KPIs across the twelve cases, IT appears as a primary category in only four, i.e., 2.8%, but as a secondary

label it is linked to forty-two indicators, i.e., 29%. This presence is detectable in every examined case, yet the center of gravity remains on revenue, cost, and lean. Consequently, in scientific terms I conclude that in the Prime environment there is no need for a separate digital KPI set; rather, companies need indicators that intrinsically embed digitalization as an operating condition.

Accordingly, the goal regarding digitalization is not to insert new, primary IT indicators into the center of the managerial map, but for the company to build a KPI system that—by definition and use—already incorporates the requirements of digital operation. Such requirements include a unified conceptual vocabulary and single source of truth, master-data discipline, automated data-quality checks and alerts, and a forum cadence where indicators appear in a shared language and in a debatable breakdown. Consistent with this, in Prime logic IT is an enabler: it makes the monthly T+ closing cycle, rolling forecasting, and threshold-based exception handling predictable, while managerial focus remains on operational and financial goals.

This framework leads to a practical recommendation. Do not build a separate digital scorecard; instead, design the definitions and data lineages of existing KPIs so that digitalization is built into use as a prerequisite of reliable execution. The corporate objective is not to display IT as a primary KPI, but to use KPIs that, by definition, already rely digitally on SSOT, MDM, automations, and an auditable data path, so debates focus on real trade-offs rather than on data cleaning.

5. MAIN FINDINGS OF THE DISSERTATION, NEW AND NOVEL RESULTS

1. I identified a distinct Prime controlling pattern and substantiated it with case evidence. The result is not a scattered set of tools but a coherent operating order in which consistent performance measurement and focused managerial forums balance regularity and flexibility. Rhythm, thresholds, accountability, and the KPI core reinforce each other and yield measurable intervention points. The pattern is provable because cycles, roles, and exception handling appear as observable properties. The research contribution is that it captures controlling practice not as descriptive anecdotes but as a recurring structure that operates with the same logic across sectors, industries, and cultural areas.

2. I highlighted cultural emphases and, as a novelty, empirically verified shifts in focus between cultural areas. The categorization rests not on theoretical templates but on the real use of KPI indicators, so I describe decision patterns along actual operating focuses. In the Anglo-Saxon context revenue is central; in the European

sample cost; in the Japanese pattern lean-type indicators. The differences are stable and numerically confirmed because I use normalized comparison and a common scale.

3. I created a general model that evaluates the performance of companies in the Prime life stage from a controlling perspective. Using the discrete Choquet integral, computed from the company's own KPI plan–actual deviations, the model yields a performance score. I convert the score into a five-level fuzzy linguistic rating for direct interpretability. In determining weights, the model also reflects the chosen cultural area. Beyond evaluation, it highlights problem areas and thus indicates directions for intervention.

4. I demonstrated the background role of IT and digitalization within the Prime controlling pattern. Case evidence shows that IT is ubiquitous, but it does not hold the system together as a primary KPI; rather, it makes the diagnostic and interactive layers faster, more accurate, and more reliable. In the study this emerged clearly from KPI classification: IT appeared 42 times as a secondary and only four times as a primary category. Scientifically this means that in the Prime environment there is no need for a separate digital KPI set, because relevant indicators already embed the qualitative attributes of digitalization (e.g., data quality, latency, consistency). The cases confirm that IT appears only rarely as a primary indicator, yet consistently and frequently as a secondary label in every case, which is direct evidence of its background, capability-enabling role.

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