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Enterprise Wide Systems: Universalistic or Contingent Solutions?

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Abstract

This paper explores whether the adoption of an enterprise wide system (EWS) is aligned with universalistic or contingent perspectives of management control system (MCS) design literature. It offers a schematic organization of the literature review on MCS design from a universalistic and contingent perspective. It considers recent adoptions of a well known EWS, discussing whether these adoptions exemplify a contingent or universalistic view of MCS. The evaluation of EWS adoptions is based on unstructured interviews with managers, EWS consultants and external accounting professionals. Interview findings suggest that although EWS are conceived as more flexible contingent systems, in practice they seem not to be. Interviewees highlighted the continuing tension between stakeholders who favour more contingent solutions (managers), and those who favour universalistic ones (consultants). The study contributes to the literature by organizing relevant work in the field around just two views of MCS (universalistic and contingent) to help to explain the alternatives a firm faces when adopting an EWS. Research conclusions must be considered preliminary as they are based on a limited sample of interviewees, identified through a snowball sampling technique. Next steps will involve larger samples, structured interviews and quantitative surveys within a longitudinal field study.

Keywords: management control systems design, enterprise wide systems, universalistic management control systems, contingent management control systems, SAP, enterprise wide systems adoption.

I. BACKGROUND AND MOTIVATION

It has been suggested that management accounting theory and studies normally react to practice changes but with significant delay (Johnson & Kaplan, 1982). However the evolution observed in management accounting consistently show that the major breakthroughs arise from two sources: companies' practices, and the incorporation of the concepts, models and theories of other disciplines. This study explores whether actual enterprise wide system (EWS) adoption practices are aligned with a universalistic or contingent perspective of MCS design as presented in the literature. This paper is aimed at helping advanced or graduate business students organize the literature on MCS design in a meaningful way. It is motivated by the paucity of published studies that offer a classification of seminal papers between contingent and universalistic perspectives (Porporato & Waweru, 2011).

The paper has four sections. This first section offers an introduction to the topic outlining the motivation, purpose and target audience. The second section offers an

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introduction to MCS design. The issue of design will be examined from different theoretical perspectives, showing why contingency theory is considered to be the most appropriate model for MCS design. A comprehensive literature review of MCS under contingency theory is the main contribution of this section. The third section briefly presents the links between MCS design and EWS adoption, using SAP®, one of the most popular EWS systems for large, complex organizations, as an example. The fourth section explores whether theoretical developments are reflected in MCS design practice, through information gathered from interviewees involved in EWS implementations in a variety of roles and locations. The study closes with a conclusion.

II. MANAGEMENT CONTROL SYSTEMS DESIGN

MCS design establishes structures and processes, and although there is an initial design phase for formal mechanisms, through continuous operation they are periodically re-designed. Informal mechanisms, on the other hand, are constantly evolving. Kald et al. (2000), based on Miles and Snow (1978), offer an interesting view of MCS design wherein management control is viewed as the result of a long process of development and reconfiguration, similar to that involved in the organization's selection of technology. According to this view, it is difficult to distinguish between the design and operation of MCS beyond the initial stage. This conceptualization implies that MCS evolve as the result of both deliberate design and emergent design in Mintzberg and Waters (1985) terms, though in the initial stages, design is primarily deliberate (Thompson, 1973). This is consistent with organizational design literature, from which MCS design is derived (Otley, 1980). Regardless of its emergent or deliberate nature, MCS design is aimed at capturing and providing relevant information for decision making (Hayes, 1977), while attending to cost-benefit tradeoffs, as design decisions are taken under uncertainty (Khandwalla, 1972).

2.1. Universalistic Perspectives

According to the universalistic perspective, every MCS design is developed within one of the following contexts, regardless of the individual circumstances faced by the firm, industry or economy: classic management, behavioral, transaction costs economics, agency theory and systems theory (Porporato, 2007), each of which is briefly introduced in the following paragraphs.

The classic management approach arose from an engineering point of view, with cost accounting being the first manifestation of the resulting management control systems. Contributions of this approach include differential and marginal costs, budgeting and return on investment in general terms. The classic management approach is based on an absolute truth orientation and on principles of management. Although some of its contributions are still in use, this approach cannot be used as the sole basis of a comprehensive theory of MCS design because it disregards, among other factors, the freedom and lack of programmability of human beings.

The behavioral line of thought emerged as an opposing perspective to classical management where the human factor was not considered. Extensive empirical and theoretical attention is paid to the effects of accounting systems on people, and the effects of people on accounting systems, using models from psychology and social psychology. The main proposition is that measurement is neither neutral nor objective, because people within the system change their behavior as a function of the measure chosen to report economic performance of the organizational unit (Siegel & Marconi, 1989). Some of the cause-effects relationships it identifies are very useful, but this approach cannot be used as

the sole basis of a comprehensive MCS design theory because it does not address the nature of organizations beyond interactions between participants.

Systems theory contributed the cybernetic model, which is very mechanistic and imposes a rationalistic framework for the analysis of organizational control. Under the systems approach, organizations are studied within the context of a larger environment in which the organization operates (open systems approach). Variance analyses and management-by-exception are consistent with the basic cybernetic view of control. Despite the rich contribution of the open-systems perspective, its models and predictions are too broad - the large number of elements that must be considered under this approach make its application very challenging.

Accountants began looking at transaction costs economics (TCE), a theory developed by economists and organizational theorists, in the Seventies, as a possible framework to explain the development and design of management accounting and information economics. TCE is a positive theory that uses a cost minimization perspective to explain organizational arrangements for mediating transactions in different settings. It predicts the degree of hierarchy required to govern different types of transactions, and has been successfully applied in the design of generic control mechanisms based on markets and hierarchies. Despite its robust contribution, TCE does not explain how the relationship between organizational arrangements is controlled in transactions; also, there are some informal aspects of MCS that cannot be fully captured under the TCE approach. Although TCE is applicable to MCS design, its scope is too heavily focused on formal control mechanisms. Such an approach must be complemented with other elements, mainly of an informal nature.

Agency theory researchers introduced uncertainty and information costs into management accounting models, adding some behavioral considerations to the economic model. Agency theory proposes that by creating additional information systems or by using the available information about the agent's actions or the state of nature, contracts can generally be improved. Despite its strengths, this theory is not suitable for MCS design modeling because it disregards the effect of capital markets (by assuming a single owner instead of multiple owners) and it allocates no role to trust and fairness.

1. Contributions of universalistic perspectives to MCS design

The approaches and theories presented can be organized around three contributions to MCS study (see table 1 for a schematic summary of the studies presented in this section). In summary, universalistic approaches enable us to see the whole picture of MCS design, but none of them alone provides a comprehensive understanding of the factors and interactions between all the factors involved in MCS design.

The first contribution is based in transaction cost economics. Initially the idea of behavior and output controls was developed in the 1970s (Ouchi & Maguire, 1975; Ouchi, 1977). It then evolved and moved toward the TCE perspective through the study of markets, bureaucracy and clan as controls mechanisms (Ouchi, 1979). Specific subsystems such as budgeting (Birnberg et al., 1983) and reward structures (Eisenhardt, 1985) were studied under this approach.

The second line of contribution comes from systems theory and asserts that an accounting system cannot be viewed as a control system per se, but must be considered as part of a carefully designed total system of organizational control. Control mechanisms must be integrated within a more complex level of systems, such as organizational structure, organizational culture, and organizational environment (Flamholtz, D., 1983; Simons, 2000), to be effective. Under this approach, accounting is viewed more as a component of a socio-technical system rather than a simple control mechanism that

operates with no connection with the organization's particular values, beliefs and norms (Flamholtz et al., 1985).

The third line of contribution has allowed authors to develop several typologies of MCS. First, rooted in systems theory, a distinction between cybernetic and non-cybernetic control mechanisms was developed (Hofstede, 1981). Hofstede's ideas were further developed into three standardized levels of control: strategy formulation, management control and task control (Anthony & Govindarajan, 2007). A second control classification scheme widely used, but rooted in TCE, differentiates between action controls, result controls and personnel and cultural controls (Merchant & Van der Steede, 2005).

Table 1
Comparative Table of Universalistic Theory-Based Studies

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contribution Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main References
Ouchi & Maguire (1975)	Conditions that govern the 2 forms of control: output and behavior	Task: interdependence, routine and complexity Means-ends relationship: technical knowledge and supervisor's expertise Organization measures: hierarchy	Output controls are used by upper levels to legitimate, and behavior controls are used to guide. The 2 forms are independent of each other	Subunits (department)	Correlation and multiple regression	329 managers of 2 department stores	Output control given and received Behavior control given and received.	Thompson (1967)
Ouchi (1977)	Organizational structure is related to control	Vertical and horizontal differentiateon. Task homogeneity. Size of training staff. Formalization Clientele income	The larger and complex the company is, the more likely that output controls are used	Firm	Multiple regression	78 infor mants in non-discount retail department stores	Use of output controls Completeness of output measures	Woodward (1965); Thompson (1967)
Ouchi (1979)	Design of general control mechanisms	Information requirements Social problems to operate controls	The design of organization control depends on the ability to measure outputs and the knowledge of the transformation process.	Firm	No, only theoretical	No, only theoretical	Control mechanisms or devises of control: market, bureaucracy and clan	Williamson (1975); Thompson (1967)
Hofstede (1981)	Types of control applicable to different activities	Ambiguity of objectives Output measurability Known intervention effects Repetitiveness of activity	Cybernetic control mechanisms (single loop) are systems that do not learn, opposite to non-cybernetic (double loop)	Activity	No, only theoretical	No, only theoretical	Cybernetic controls: routine, expert and trial and error Non cybernetic controls: intuitive, judgmental and political	Thompson (1967)

To be continue table 1

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contributi-on Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main Referen-ces
Birnberg et al., (1983)	How organi-zation mem-bers, can or do utilize the info.systems to their own ends	Task characteristics Technology	Accounting information system is not neutral (behavioral perspective)	Firm	No, only theoretical	No, only theoretical	Behavior or output controls in budgets	Demski & Feltham (1978); Williamson (1975)
Flamholtz, (1983)	Accounting system is a part of a total system of organizational control	Organization-al levels of analysis: structure, culture and environment	Accounting is a component of a socio technical sys-tem, rather than a techni-cal control mechanism	Firm	No	3 case studies	The core control system is formed by: planning, operations, measurement and evaluation.	Lawrence & Lorsch (1967); Thompson (1967)
Flamholtz et al., (1985)	Develop a comprehensi-ve theory of organization control	Organization level of ana-lysis: struc-ture, culture and environ-ment. Orga-nizational effectiveness.	Propose a more refined general model than in Flamholtz (1983)	Firm	No, only theoretical	No, only theoretical	The core con-trol systems is formed by: planning, measurement, feedback, and evaluation-reward.	Lawrence & Lorsch (1967); Thompson (1967)
Eisenhardt (1985)	Control vari-ables influen-ces on organi-zation design (easy of mo-nitoring)	Task charac-teristics (pro-grammability) Cost of mo-nitoring (in-formation systems based on behavior or output). Uncertainty	Control is an important aspect of or-ganizational design. Behavior and outcome rewards are substitutes	Firm (store)	Correlation Discrimi-nant analy-sis for other models	54 store managers surveyed	Behavior ver-sus outcome based reward structures.	Thompson (1967)
Anthony & Govindaraj an (2007)	Identify levels of planning and control systems	Structure Strategy	The planning and control activities vary and adapts to each level of the firm	Firm	No, only theoretical	No, only theoretical	Levels: strategy formulation management control task control	Anthony (1965); Vancil (1979)
Merchant & Van der Steede (2005)	Study typology and use of control mechanisms	Lack of direction Motivational problems Personal limitations	Each type is adequate for certain object of control and the three are comple-ments of each other	Business unit	No, only theoretical	No, only theoretical	Action con-trols. Results ontrols. Personnel or cultural controls	Williamson (1975)

Source: translated and adapted from Porporato (2007)

2.2. Contingency Theory

The contingent control literature is based on the premise that a correct match between contingent factors and a firm's control package will result in desired outcomes. Contingency theory explains how an appropriate MCS can be designed to match the organization structure, technology, strategy, culture and environment of the firm. It suggests that universal applications are inappropriate and a framework for analysis is developed to suggest alternative budgeting, transfer prices systems, performance measures, incentives and evaluation uses in organizations. This approach is appealing

because it can explain almost everything that does not fit completely in universalistic approaches. Nevertheless, contingency theory reviews are largely negative (Otley, 1980; Tiessen & Waterhouse, 1983), indicating the lack of an overall framework for the analysis of the relationship between contingent factors and accounting (Chapman, 1997; Chapman et al., 2007).

1. Contingency theory developed in organizational theory

Studies in the 1960s criticized universal theories (classic and human relations) and presented contingency theory as a useful tool to improve organizational theory. Three early studies offer a body of evidence that different organizational forms are required to effectively deal with different task, structural, cultural, strategic and environmental conditions. Burns and Stalker (1961) concluded that effective organizational units operating in stable environments are more structured, while those operating in more dynamic environments are less formal. Woodward (1965) found that the management control approach varied according to technical differences between small batches, large batches and continuous production. Finally, Chandler (1962) asserted that organization structure follows from and is guided by strategic decisions.

The works of Thompson (1967) and Lawrence and Lorsch (1967) followed from this organizational theory base, and are considered to be the first texts addressing contingency theory. Lawrence and Lorsch (1967) divided organizations into two simple types: differentiated and integrated. Thompson (1967) attempted to demonstrate that universal theories were not completely accurate as not all outcomes could be explained by using just one theory or approach, therefore contingent approaches must be considered. Regarding universalistic approaches Thompson (1967) refers to scientific management (Taylor, 1911), administrative management (Gulick & Urwick, 1937), or bureaucracy (Weber, 1947). In early contingency theory studies, organizational design was rooted in technology and environment, therefore these variables defined the major constraints and contingencies for an organization within a given domain.

2. Contribution of contingency theory to management control systems design

MCS design studies that fall under the contingency theory perspective address five main contingent factors. Environmental uncertainty, organizational structure and technology were addressed first, as an application of traditional organizational theory. Later, human factors were included under the general denomination of culture or management style. The final contingent factor identified and studied was strategy (see table 2 for a summary of the studies presented in this section).

Chronologically the first contingent factor is environmental uncertainty. The environment encompasses everything outside the boundaries of the organization. Studies of the environment differentiate between the external and competitive environments. The competitive environment refers to Porter's five forces model (Porter, 1980), while the external environment is determined by geographical, cultural, and regulatory elements. The environmental variable is further complicated by the fact that some researchers try to assess environment uncertainty, while others focus on a more subjective measure such as perceived environment uncertainty. Despite its relatively clear definition, the macro variable of environmental uncertainty has numerous underlying facets. Khandwalla (1972) offered one of the first empirical definition and his constructs continued to be used and improved by others (Hayes, 1977; Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Simons, 1990). Other studies were more theoretical papers focused in either determining the conditions for environmental predictability (Waterhouse & Tiessen, 1978; Otley, 1980; Tiessen & Waterhouse, 1983; Dent, 1990), or addressing the external environment as a whole unit (Fisher, 1995; Chapman, 1997; Langfield-Smith, 1997).

Table 2
Comparative Table of Contingency Theory-Based Studies

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contributi-on Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main Referen-ces
Khand-walla (1972)	Intensity of competition and control mechanisms	Perceived Intensity and importance of: price com-petition Promotion and distri-bution, Product quality and variety	Higher levels of compete-tion (product and market) lead to more controls.	Firm	Correlation and regression	92 presi-dents of US firms	Standard costs, marginal or in-cremental cos-ting, flexible budgeting, in-ternal auditing, operational ex-ternal auditing, use of discount cash flow, sta-tistical quality control, inven-tory control, and systematic evaluation of managers.	Lawrence & Lorsch (1967)
Vancil (1973)	Typology of MCS	Strategy Structure	MCS design is top management responsibility	Firm	No, only theoretical	No, only theoretical	Basically financial measures	Anthony (1965)
Hayes (1977)	Contingencies that affects subunits performance	Internal: pro-ductivity, cost behavior, supportive relations, manpower utilization and work group cohesion. Interdepen-dency: relia-bility, coope-ration and flexibility. Environment al: planning ability, share of market, dealers opini-on, environ-mental stabi-lity and diver-sity.	Management accounting tools (budgeting or financials) are unsatisfactory to measure performance	Subunits (departme nt)	Factor and path analysis	274 mana-gers, 190 controllers, 24 firms with a complete set of 4 responses	No, the purpose was to measure performance.	Thompson (1967); Lawrence & Lorsch (1967)
Waterhou-se & Tiessen (1978)	Structure of an organiza-tion depends on its con-text, and different structures requires different control mechanisms	Technology routines Environment predictability Managerial and operati-ons functions of organiza-tions (struc-ture, authority and power)	Environment and technolo-gy conform the context that influence in organizati-on structure that explains the choices of control me-chanisms.	Subunits	No, only theoretical	No, only theoretical	Planning and resource allocation Performance measures	Lawrence and Lorsch (1967), Thompson (1967)

To be continue table 2

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contributi-on Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main Referen-ces
Otley (1980)	Situational factors defines the best possible design that impacts on effectiveness	Technology Organization Structure Environment	Accounting information systems are a part of a wider management information system	Firm	No, only theoretical	No, only theoretical	Different levels: accountting information system, management information system, management planning and control systems, overall control system.	Woodward (1965); Burns & Stalker (1961)
Tiessen & Waterhouse (1983)	The purpose is to explain why management accountting systems are as they are	Organization Structure: authority and activities Technology Environment	When contracts are not predictable, agency theory or TCE cannot be used, providing contingency a good framework	Firm	No, only theoretical	No, only theoretical	Management accounting systems are seen from different theoretical perspectives, being the most developed one as internal labor markets.	Thompson (1967); Williamson (1975)
Gordon & Narayanan (1984)	Relationship between organization environment, structure and information systems	PEU (stability, new products, predictability of competitors, scientific discoveries, competitiveness and regulatory constraints). Organization structure (delegation, formalization, level of operating decision, managerial style and specialization)	Information systems and structure are both function of the environment	Firm	Factor analysis, simple Pearson and partial correlation	Structured interviews to senior managers of 34 US firms	External oriented information (financial and ex post nature). Non-financial oriented information (internal and ex post nature). Ex ante oriented information (internal and financial nature)	Lawrence & Lorsch (1967); Weick (1969)
Govindara-jan & Gupta (1985)	Examine linkages between strategy, incentive bonus system and effectiveness of SBU	Strategy: build, hold and harvest Effectiveness of SBU Importance of performance criteria for bonus determination Subjective determination of bonus.	Long-run performance measures and subjective approaches were more effective for determining in build SBUs manager compensateon than in harvest SBUs.	Business unit	Two regression equations	46 SBU's general managers	Incentive bonus system (performance and appraisal system)	Lawrence & Lorsch (1967); Miles & Snow (1978)

To be continue table 2

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contributi-on Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main Referen-ces
Chenhall & Morris (1986)	Effect of structural decentralizati on, PEU and organizational interdepende nce on MAS design	Structural decentralizati on perceived environment-al uncertainty Organization-al interde-pendence	MAS design effectiveness is measured by perceived usefulness (directly re-lated with decentralizati on, and indi-rectly with PEU and org. interdepend-dence).	Subunits	Regressions and path analysis	68 mana-gers in 3 Sydney's companies	Scope: focus, quantification and time horizon Timeliness Level of Aggregation Information for integration	Lawrence & Lorsch (1967); Thompson (1967)
Simons (1987)	Explore the alignment of control sys-tems and firm strategy	Business strategy: prospector or defender Industry dynamism and profit-ability	Prospector firm custom tailor their control sys-tems to users needs more than defenders	Firm	Binary logistic regression. Correlation analysis.	76 firms	Control sys-tems attrib-utes: tight budget goals, external scan-ing, result mo-nitoring, cost control, fore-cast data, goals related to out-put effective-ness, reporting frequency, for-mula-based bo-nus remunera-tion, tailored control sys-tems, and con-trol system changeability.	Miles & Snow (1978); Thompson (1967)
Kren & Liao (1988)	MAS effect-iveness in performance evaluation depends on system attri-butes and supervisors use.	Task or goal uncertainty Strategic goals	Universalistic explanations are too sim-ple for acco-unting per-formance measures.	Firm	No, only theoretical	No, only theoretical	Special atten-tion is devoted to budget, par-ticipation/moti vation and slack.	Thompson (1967)
Govindara -jan (1988)	The matching of strategy, organization structure, control systems and manager's expectative leads to superior perform	SBU strategy: mission (built, harvest), competitive (low cost, differentiate-on). Environment and task un-certainty (or-ganizational structure) Outcomes: SBU effect-iveness and manager's job satisfaction.	High mana-gerial internal locus of con-trol and low emphasis on meeting the budget are associated with high performance in SBUs with a differentia-tion strategy	Business unit	Multiple regression	75 SBUs managers of US companies	Budgeting: participation, revisions, goal difficulty, and evaluative style. Incentive com-pensation: per-formance cri-teria, bonus determination, mix, frequency, and form of payment. Output vs. behavior control.	Lawrence & Lorsch (1967); Thompson (1967)

To be continue table 2

	General Theme Addressed	Variables Used to Explain MCS Variability	Principal Conclusion/ Contributi-on Made	Unit of Analysis	Statistical Method	Sample	Dimensions Analyzed of MCS	Main Referen-ces
Dent (1990)	Relationship between control and strategy	Strategy and structure, content, and decision-making. and change. Environment, technology and size.	New MCS allows changes in responsibilities and linkages to the environment, facilitating organizational change.	Firm	No, only theoretical	No, only theoretical	It is addressed as a whole and unique issue.	Lawrence & Lorsch (1967)
Govinda-rajan & Fisher (1990)	The level of resource sharing and control over the manager of an SBU are functions of the SBU's strategy	Business Strategy: low cost or differ-rentiation. Level of resource sharing SBU effect-tiveness mea-sure on 10 performance dimensions.	In low cost SBUs with high levels of resource sha-ring, output control is as-sociated with higher effectiveness.	Business unit	Regression analysis	121 SBU's managers	Behavior or output	Eisenhardt (1985)
Simons (1990)	Link between competitive advantage and design and used of MCS	Strategy, Structure and Environment. Factors consi-dered: limited attention of managers, strategic uncertainty, interactive management control and organization learning.	Interactive management control processes can be used to manage emergent strategy	Business unit	No, only theoretical	2 case studies	MCS at top management levels: strategic planning revi-ew, financial goals, budget preparation-review-update, program revi-ews, evaluation and rewards.	Miles & Snow (1978)
Fisher (1995)	Review of contingency theory literature in MCS	External environment Competitive strategy and mission Technology Unit, firm and industry variables Knowledge and obser-vability variables.	There is no best universal design of MCS	Firm	No, only theoretical	No, only theoretical	General con-trol mecha-nisms: firm structure, soci-alization, cultu-re, human re-sources polici-es, standard o-perating proce-dures and pro-gramming. Formal control systems: bud-getting, non-financial, in-centive com-pensation and non-monetary rewards.	

To be continue table 2

	General theme addressed	Variables used to explain MCS variability	Principal conclusion/ contribution made	Unit of Analysis	Statistical method	Sample	Dimensions analyzed of MCS	Main references
Chapman (1997)	Review of contingency theory literature in MCS	Structure: centralization Complexity: technology, environment and strategy	There is not best universal design, but CT has still to improve	Firm	No, only theoretical	No, only theoretical	Accounting performance measures. Organization structure and strategy impact on MCS as a whole.	
Langfield-Smith (1997)	Review of literature on MCS and strategy	Strategy Competition (PEU). Discrete decision making. Resource sharing.	So far it is not clear what role MCS can play to bring intended strategies to realization.	Firm	No, only theoretical	No, only theoretical	Cost control Performance evaluation Reward systems	
Harrison & Mc-Kinnon (1999)	Literature review of culture and MCS design	Culture dimensions: power distance, individualism, uncertainty avoidance and masculinity	Culture exists and affects or interacts with MCS in isolation from other variables	Firm	No, only theoretical	No, only theoretical	Formalization, locus of con-trol, and plann-ing range Budgeting, slack and planning process. Compensation: evaluation and reward.	Hofstede (1980)
Kald et al., (2000)	Relationship between business strategy, MCS design and use	Strategic patterns, position and mission	Strategy characteristics might be useful to discriminate studies of strategy and MCS.	Firm	No, only theoretical	No, only theoretical	Organizational structure. Informal and formal processes. Tight or loose control.	Miles & Snow (1978)
Priem & Rosenstein (2000)	Obviousness of CT	Strategy: low cost or differ-rentiation Structure: formalized or not Environment: dynamic or stable.	MBA are closer to the concepts of CT than any other group (CEO and non MBAs)	Individual	Metric cojoint analysis	Experi-ment (factor design 2x2x2)	Not addressed	Lawrence & Lorsch (1967); Thompson (1967)

Source: translated and adapted from Porporato (2007)

Organizational structure is next within the first set of contingent factors addressed. Organizational structure consists of firm and unit variables, such as firm size, business unit size, firm business, business unit products or services, firm diversification and firm structure (multi divisional M-Form or multi functional U-Form). Most researchers agree that structures establish roles and responsibilities that guide participants' actions, which in turn, affect MCS design. Most empirical studies analyze the effects of structure and environment on MCS (Hayes, 1977; Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Simons, 1990), while others relate structure to strategy (Govindarajan, 1988). Theoretical studies also examine the relationship between MSC and authority and power (Waterhouse & Tiessen, 1978; Tiessen & Waterhouse, 1983), but most focused on MCS's

relationships with strategy (Vancil, 1973; Kald et al., 2000), environment (Otley, 1980), or both (Dent, 1990; Fisher, 1995; Chapman, 1997).

Technology is also among the first set of contingent factors. Technology has been characterized through different schemas: small/large batches and process/mass production (Woodward, 1965), number of exceptions in the production process (Perrow, 1967), and pooled, sequential and reciprocal interdependencies (Thompson, 1967). Technology studies relate technology to environment and structure both from an empirical perspective (Hayes, 1977; Chenhall & Morris, 1986) and from a theoretical perspective (Waterhouse & Tiessen, 1978; Otley, 1980; Tiessen & Waterhouse, 1983; Fisher, 1995; Chapman, 1997).

The second set of contingent factors is related to the role of humans in MCS, and the impact of culture (the social pattern that guides worker behavior, policies and practices) and management style. Empirical studies report the impact of management style (Govindarajan, 1988; Simons, 1990) and culture (Markus & Pfeffer, 1983) as marginal due to the low incidence they have in the models. On the other hand, theoretical studies pay more attention to these factors as they are extensively described and relations with MCS clearly hypothesized (Langfield-Smith, 1997; Harrison & McKinnon, 1999).

The final contingent factor is strategy. Strategy has been classified according to several bases: value proposition (low-cost, differentiation and focus) (Porter, 1980), roles (defenders, prospectors, and analyzers) (Miles & Snow, 1978), and life cycle status, which differentiates between build, hold, harvest and divest strategies (Porter, 1985). Empirical studies were carried out initially by Harvard scholars (Govindarajan & Gupta, 1985; Simons, 1987; Govindarajan, 1988; Govindarajan & Fisher, 1990; Simons, 1990) to evaluate the effectiveness of strategic business units as it relates to various combinations of competitive factors; newer studies are also based on experimental designs (Priem & Rosenstein, 2000). Few theoretical papers addressed effectiveness (Kren & Liao, 1988), instead, most of them provided strategy classification schemes (Vancil, 1973; Dent, 1990; Fisher, 1995; Chapman, 1997; Langfield-Smith, 1997; Kald et al., 2000).

The findings of contingency theory can be summarized in the relationships between the factors identified and MCS design. While Khandwalla (1972), Chenhall and Morris (1986), Govindarajan (1988) and Simons (1990) assert that the impact of environment on MCS is direct, Gordon and Narayanan (1984) assert that the impact is indirect through structure. Consistent with the first argument, Chenhall and Morris (1986) and Simons (1990) show that the impacts of environment and structure on MCS design are independent from each other. Technology has also been accepted as a factor in MCS design, but its independence from environmental effects is unclear. Waterhouse and Tiessen (1978) were unable to separate the effects of environment and technology, while Chenhall and Morris (1986) asserted that the technology impact on MCS design is independent of the environmental impact. Strategy, on the other hand, is accepted as an independent factor that impacts on MCS design (Govindarajan & Gupta, 1985; Simons, 1987; Govindarajan, 1988).

Although it appears that contingency theory produces diverse findings, a closer look reveals that most of the differences arise from inconsistencies in the way researches define the meaning of each factor used, particularly the variable constructs used for empirical measurement. For instance, while some studies measure environmental uncertainty, which can be considered as objectively measurable, others measure perceived environmental uncertainty, a subjective measure that reflects the respondents' impressions.

III. PRACTICAL APPLICATIONS OF MCS DESIGN

Professional journals[1] constantly provide checklists for use in MCS design. In their book, 'Cost & Effect', Cooper and Kaplan (1997) summarize the findings of many researchers and identify four levels of cost and performance measurement systems:

1. Stage I systems: inadequate for financial reporting (poor internal controls for recording transactions so that transactions are either not recorded or are recorded incorrectly).
2. Stage II systems: financial reporting-driven (allocate costs adequately for financial reporting and for assigning costs to responsibility centers, but provide either no information or distorted information about the cost of activities, processes, products, services and customers).
3. Stage III systems: customized, managerially relevant, stand alone (composed of three stand-alone systems: traditional financial reporting, activity based costing (ABC) systems for information about the cost of processes, products and customers, and operational feedback systems to promote local efficiency and process improvements).
4. Stage IV systems: integrated cost management and financial reporting (integrate ABC and operational feedback systems, implying to put together the three systems of Stage III into an enterprise wide system).

The consensus within professionally oriented publications is that to realize the full potential of modern MCS, companies may need to integrate information from many disparate sources to create a Stage IV system. This requirement can be met thanks to new hardware and software technology that emerged in the 1990s and enabled companies to create enterprise-wide systems (EWS). These systems integrate and organization's operating, financial and management functions using one common database. Data is entered once and is accessible to all, supporting both internal and external reporting. According to Cooper and Kaplan (1997), these Stage IV management systems provide performance information for operational improvement and strategic learning, and accurate measurement of product and customer profitability. Empirical studies have supported this assertion, demonstrating that companies with fully implemented EWS systems are more profitable (Romero et al., 2010). Interestingly, the EWS philosophy is typically presented as a customized design for each company, relying more on a contingent approach than in an universalistic one.

3.1. Enterprise Wide Systems (EWS): Understanding SAP®

SAP® is the most pervasive EWS in large and complex organizations worldwide. SAP is the name of both the EWS itself (SAP® is an acronym of "Systems, Applications, & Products in data processing) and the Germany-based company that developed and sells it. The SAP® model is based on a contingent approach to MCS design. Although a complete version of SAP® is available, this section refers only to the data collected for the design and implementation of the cost control and financial reporting modules. According to the definition provided by Cooper and Kaplan (1997), SAP® fits best within Cooper and Kaplan's Stage IV EWS systems because it integrates all the operating, financial and management systems of a company within one covering software package. Romero et al. (2010, p. 118) supports this view as they state that "ERP plays a major role in standardizing business processes". A general view of the parts, interrelations and basic concepts of SAP® are in the following figures.

[1] Accounting Horizons, Harvard Business Review, Sloan Management Review, CMA Management, Accountancy Ireland, CA Magazine, and the Journal of Accountancy among others.

Figure 1
SAP® Overview of the Main Systems

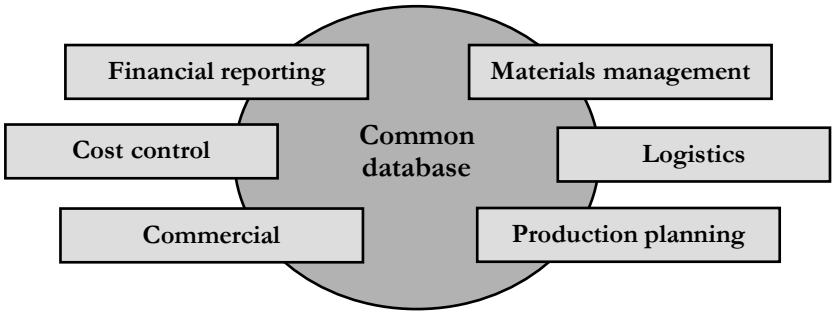
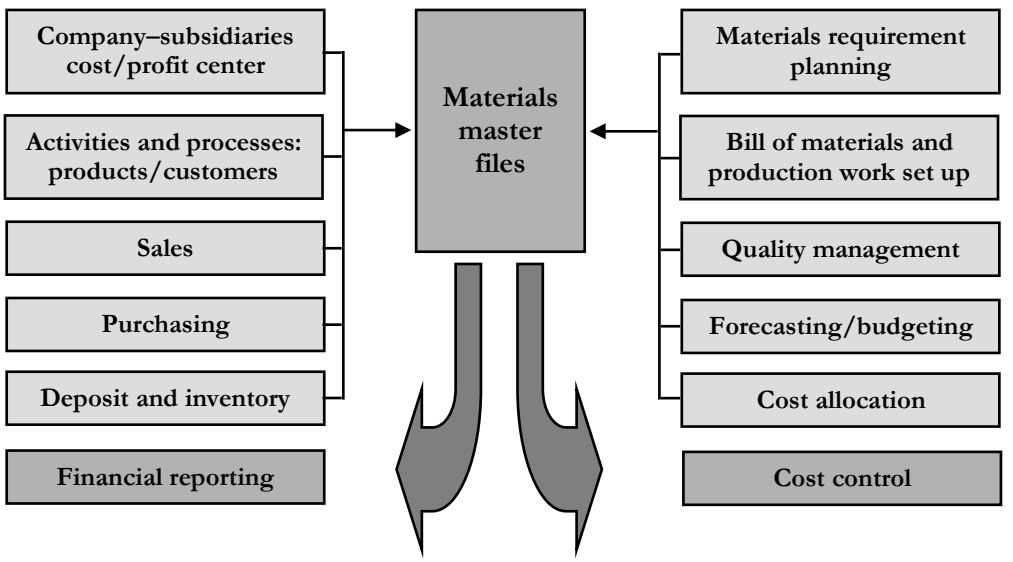


Figure 2
Data Sources of Financial Reporting and Cost Determination Modules of SAP®



Financial reporting: is relevant to value material, control prices, and determine the balance of each account and sub-account reported in the general ledger.	Cost control: contains the data to control the determination of material costs, also contains the cost characteristics required by financial reporting.

SAP® consists of six major systems: financial reporting, cost control, commercial, materials management, logistics and production planning. The common database at the core of SAP® can be populated through any of the six systems, or calculated from those systems (based on regular parameterization defined in the design stage.) The establishment of informational ties between the six systems requires a high degree of interaction between the consultants involved in their design/configuration and the internal specialists or users.

It is helpful at this point to discuss the concept of customization as it is used in EWS implementations. In particular, we will use terminology common in SAP® implementations. There are three primary levels of customization in the implementation process. The first is configuration. Configuration fundamentally involves providing the EWS with the business's operating parameters – everything from master data such as the chart of accounts to specifying business processes and their outcomes to defining trigger

points for decisions such as revenue recognition. Where multiple systems are used, it also involves the establishment of informational ties between the systems. Every EWS adoption necessarily involves configuration.

The second level of customization involves Application Programming Interfaces (APIs). These interfaces can be described as "back doors" into the core database at the heart of the EWS. APIs are built into EWSs to allow an interface with an external system or application. Through APIs, data can be extracted from the core database, manipulated in the external application, and then reinserted into the core database. External applications add a layer of complexity to the EWS, because they must be maintained separately, and the interface must be monitored. However, these applications allow for a degree of customization which is not necessarily practicable within the core EWS itself, and are recognized as advantageous by the allowance for their accommodation within the software design itself.

The final level of customization involves changing the core EWS programming directly. This type of customization is undertaken when the EWS is incapable of fulfilling user requirements either through configuration or APIs. Customization at this level is very costly, both during implementation and on an ongoing basis. When changes are made to the core EWS programming, routine programming updates ("patches") must be scrutinized for compatibility with the changes before they can be implemented. Version upgrades are an even more serious problem. The programming changes move the adopter off the vendor's development path, and hence may require the adopter to incur significant costs and delays in implementing version upgrades, to allow for re-customization of the new version. These types of problems are not encountered for configuration or API level customizations, which are allowed for in the version upgrades.

IV. INSIGHTS FROM ACTUAL ENTERPRISE WIDE SYSTEMS (EWS) ADOPTIONS

This section briefly discusses the research design and presents the data gathered. This qualitative field study is of an exploratory nature interested in contrasting the deductive logic of the literature review in MCS design and what is actually done in the field when a company adopts an EWS. As a first step, the researchers relied on an informal data gathering by engaging in unstructured interviews with the three critical types of actors: vendor consultants of EWS, managers of companies adopting EWS, and external auditors of firms that are in the process of adopting EWS. The interviews were made in diverse contexts, with interviewees who have worked on EWS implementations in Argentina, Australia, Canada, Hong Kong and the US.

4.1. Research Design Decisions

A total of eight subjects were interviewed. All were involved in EWS adoptions between the years 2005 and 2011, four as SAP consultants, two as end user managers, and two as junior auditors associated with an international 'Big 4' firm. The adopting entities were of various sizes - 2010 revenue levels were US$25 million, US$100 million, US$1 billion, US$5 billion and US$15 billion. The sampling method used was a snowball technique.

Interviewees occupied a variety of roles in the implementation process, but encompassed four key groups: end user managers, internal consultants/process experts, external consultants, and external auditors. The internal and external consultants had some longitudinal background. The internal consultants had been involved in a succession of EWS implementations within the same organization over a period of up to

15 years. The external consultants were also involved in multiple implementations, but had less direct experience of their immediate and longer term aftermath. In each case, the most recent major EWS implementation in which the interviewee were involved was the SAP system. The most recent adoptions took place between 2008 and 2011 or were currently underway, however; interviewees also referred to previous adoptions of EWSs other than SAP, and earlier phases of SAP adoptions.

The semi-structured and confidential interviews were focused around a set of key ideas. The main purpose of the interviews was to get a sense of whether the EWS solutions ultimately adopted were better described as tailor made or standard. Secondary purposes included assessing how well each participant knew the business of the company adopting the EWS, the capabilities and features of the EWS, and the effect of time and cost pressures on the adoption process. Finally, the interviews covered reasons for time and cost overruns where applicable, and explored interviewees observations of trends in EWS adoptions.

The decisions taken in this research design impose limitations on the conclusions. The main limitation of this research is that it is based on a small but representative sample that for six interviewees triangulates data from different actors involved in two projects. The decision to carry out the interviews with a variety of actors in different languages (Spanish and English), geographical locations and entity sizes was undertaken in an effort to corroborate the results across different contexts, rather than for comparability purposes (Chapman et al., 2007) . Next steps of this research will involve larger samples, structured interviews and surveys in the quantitative front and a longitudinal field study. Due to the limitations noted, the results of this study have to be considered as preliminary.

4.2. Results

With the exception of the external auditors, all interviewees reported that the EWS ultimately adopted was customized to the business. Interestingly, the end user managers reported that they had to advocate strongly in order to obtain the level of customization they required, and felt that the level achieved was at the lower end of their expectations. The consultants on the other hand, expressed discomfort with the high level of customization ultimately incorporated in the EWS, indicating that it was costly and in some cases, unnecessary. Both end users and consultants agreed however that the level of customization required was higher than was originally anticipated when the adoption process commenced.

Interviewees identified three main sources of customization requirements. The first source is legal and regulatory requirements. In some cases, the nature of the business or the environment in which the business operated (particularly for multinational companies) required process changes from the EWS standard and occasionally from the adopter's internal standard as well. The second source can be described as business norms that are not anticipated by the EWS. End users report that their way of doing business cannot be achieved within the EWS but cannot be changed without putting the business itself at risk. Finally, some customization results from an underlying resistance to change that cannot be tied to either legal/regulatory requirements or to business imperatives. Interviewees mentioned that one of the key customization challenges is the difficulty of determining the importance/priority of each customization request. It is not always clear or obvious into which category a given customization request falls, nor is it always possible to have the various stakeholders agree on the category within which it falls.

When asked to identify the ideal level of customization required within an EWS, perspectives differed depending on the interviewee's role. Managers of the adopting

companies initially approached the process of EWS adoption as an opportunity to capture all the particularities of their companies in a comprehensive system. As the EWS adoption advanced, managers felt that some customization was achieved but not at the level that they originally expected. Internal and external consultants indicated a lower level of customization as ideal. They favored putting significant resources and leadership into configuring the core EWS, and then using APIs and external applications to further accommodate critical business processes. They were very averse to programming changes at the core EWS level, with one interviewee lamenting the resources available to the implementation team which enabled core programming customization that would have otherwise been avoided. Despite their aversion to programming changes, the consultant interviewees had observed these types of changes in each EWS adoption. The primary reasons for the aversion are as follows:

1. Future cost burden – one interviewee indicated that the changes made during a previous EWS adoption had rendered any version upgrade to be prohibitively expensive. Once adopted, the EWS in question was never upgraded. The entity eventually decided that it would be more cost effective to replace the EWs entirely.
2. User adaptation – Interviewees in the consultant role reported an established patter in user satisfaction with the system. Users are often initially resistant to the new EWS and may report its impact as neutral or even negative. However, over time, as the users learn to work with the new system, as irritants in the system are addressed, and as organic employee turnover takes place, users accept the system and adapt to it.

Finally, interviewees were asked to consider trends they have observed in EWS implementations. Several trends were identified that related to customization. First of all, EWS software itself, including SAP, is becoming more flexible. Vendors are recognizing that the ability to customize is an important factor in EWS implementations perceived as successful by the adopters. As such, there is a trend toward more open software that is increasingly configurable and incorporates APIs in more places and with additional functionality. A second trend is standardization across EWS systems. User demand for remote and mobile access to business information has forced EWS vendors to respond with more standardized reporting and technical formats. A somewhat counterintuitive result of this standardization is that it facilitates customization. External applications are more easily interfaced with the core EWS, and a greater variety of external applications is available as fewer resources are devoted to customizing interfaces.

The data gathered from the interviews showed two very different perspectives depending on who was telling the story of the EWS adoption. On one hand the view of managers indicated that the EWS provided some of the solutions they were hoping for, but the deliverables were typically late, and less customized than originally expected. Conversely, the consultants commented that project complexity was higher than originally expected, resulting in delays and modifications to deliverables. Cost minimization and time saving strategies, primarily through the re-use of solutions developed for previous implementations, were used to keep the project on track. The junior auditors provided an interesting perspective on the issue; they favored standardized EWS adoptions because they make the auditor's transition between clients easier. Their perspectives can be summarized in table 3.

Table 3
Interviewees Perspectives on Tailor Made vs. Customization of SAP

Issue/ Concept	End User	Internal/External Consultant	Auditor
Solutions implemented: Expected	Tailor made	Standard (adapted from solutions provided to prior clients).	Similar reports across companies
Actual	Not so customized	Excessive customization	
Knowledge of the nature of the company business	High	Medium to low	Medium
Knowledge of EWS features	Low to medium	High	Low
Time pressure to implement EWS	High	High	Not relevant
Cost minimization (savings) in EWS implementation	Work closer with consultant and provide more information and support	Adapt solutions provided to other clients	Not relevant
Complexity of the project before and after the adoption was completed	Medium to high	Medium to high	Not relevant
Reason for retaining the consultants more than planned	Underestimation of the company's business complexity by the vendor at the time of signing the agreement	Underestimation of the complexity of the project by the sales people of the vendor	Not relevant

4.3. Discussion: Myths and Realities of an EWS Adoption

An overview of SAP® benefits shows that the system is designed to be adapted (customized) to each particular company through configuration. The MCS design that most EWS (SAP®, Oracle® or any other) require is aligned with the contingent approach to MCS design discussed earlier in this paper. However, in most cases the design and implementation is carried out by consultants who prefer standardized solutions they may have used in previous assignments, which are presented as "best practice". This view echoes that of Poettcker (2009, p. 10) "A standardized template is easily entered into SAP for every project". In a multiple small project environment, there are usually too many projects being managed simultaneously to allow sufficient time to build a unique breakdown structure for each project". This approach is best characterized as universalistic. Quattrone and Hopper (2006) argued that information technology is diverse and heterogeneous but at the same time it is homogeneous; they labeled this paradox as 'heterogeneous' pointing out that information technology appears homogeneous and for that reason it generates heterogeneous uses.

There are two explanations for the apparent paradox reported in the literature and found in this study. First consultants know the EWS potentiality far better than they know the business of the client company. Employees/internal specialists know the business far better than the EWS. A balance must be achieved, but time is a scarce resource for both parties. The second reason arises from the pressure to minimize implementation costs. Cost minimization is typically achieved by minimizing training programs and accelerating implementation phases/dates. When facing a deadline, senior EWS consultants recycle

proven solutions provided to other companies. Internal consultants and end users are still developing their knowledge of the EWS, and do not question the consultant's proposed approach. As a result, the proposed approach is implemented with the expectation that it will be reformulated in the future when the contract is re-negotiated. This negative dynamic arises from the information asymmetry between MCS designers and users, and is magnified by the lack of cooperation between company employees and external consultants who are not beholden to either to the client company or the system provider. A final important element that further complicates the picture is the general resistance to changing existing methods and processes, even when they are not completely satisfactory.

Despite its practical implementation difficulties, the idea of EWS is very appealing. Its great advantage is that it makes business operations visible and susceptible to control at a distance. Quattrone and Hopper (2001) argue that SAP®, rather than having specific fixed features and functions, offers a complex process of fabrication that defines its features. Those characteristics enable SAP® and other EWS to travel across conventional and geographical boundaries and become best sellers in the market for packages that offer integration and management control within large and complex organizations. As noted, EWSs such as SAP® or Oracle®, offer flexibility and adaptability. However the level of complexity faced at the initial implementation phase limits their potential. Consequently, the very characteristics which make EWSs so attractive in the first place (customizability) morph slowly but surely, under implementation pressure, toward a systematic, uniform approach more aligned with universalistic theories of MCS design.

V. CONCLUSION

This paper summarizes and organizes the major MCS design studies for researchers and advanced business students in a dichotomous way. It presents the evolution and current state of MCS design studies, and offers an interpretation of the literature that supports the use of contingency theory to frame the design decisions for EWSs.

By the mid 1990s, the accounting systems supporting financial reporting and management accounting had diverged to the extent that separate systems were required in many cases in order to address the respective needs of internal managers (management accounting) and external stakeholders (financial reporting) (Scapens, 1999). This divergence developed principally because advances in information technology made it possible to separate the requirements of external reporting from internal reporting, and the cost of providing the information was been drastically reduced. With the introduction and use of EWS systems, the separate systems have become re-integrated, relying on a common, comprehensive data set. Managers are now using EWSs to prepare more flexible financial and non financial performance reports (Miller & O'Leary, 1993).

Although researchers' contributions to the understanding of MCS design have been impressive, the field is not well organized around a clear set of theories (Chapman et al., 2007). It has been suggested that real needs of companies are not well assessed by academicians, who sometimes label those researchers/consultants that focus on 'ready-to use development tools' as "not scientific". In summary, although MCS design literature has evolved over the last couple of decades, there is still a long way to go before all the studies are more focused on explaining what real companies' do within the framework of robust theories.

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