Reference lost - first explorations on use of management accounting and control in business model transformation

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Abstract: The digital revolution requires many organisations to radically change their existing business models. Research on business model change has identified and discussed a wide range of factors driving processes of business model transformation (BMT). However, this research has focused on elements of "first-level change" (such as processes, technologies, and organisation structures). Second-level change, that is change in management accounting and control systems (MACS), has been entirely neglected within extant research on BMT. This paper undertakes a first step in closing this gap by (1) identifying the ambidextrous demands BMT poses on MACS as elements of second-level change; (2) theoretically exploring potential ways in which organisations can address this ambidextrous challenge; and (3) defining issues for further research on the role of MACS within processes of BMT.

Keywords: Business Model Transformation, Management Accounting and Control Systems (MACS), Digital Transformation, Change Management, Management Accounting Change

1 Introduction

Over the last twenty years, digital technology has started to disrupt a growing number of industries, such as music, media, retail, or travel industry. Organisations in these industries are required to radically transform the way they are doing business. Not surprisingly, a substantial body of research has amassed on such business model changes (for an overview see [SS14, SSR14, ZAM11]). This research increasingly differentiates between business model innovation (resulting in new and additional business models being added to an organisation's portfolio of business models; see for a classification [Cs14]), and business model transformation (BMT), during which an established business model is being substituted through a new business model ([Aj13]).\(^2\) Research on BMT has shown that BMTs affect most elements of an organisation such as processes, technology, organisation structures, culture, and leadership style ([Cs14, KVO14]). Moreover, BMTs are characterised by a co-existence of extant and new business model ([KVO14, Mf14, VS13]), which can in many cases not be organisationally separated (as they address the same customers or draw on the same crucial resources).

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\(^2\) "Business model migration" ([KVO14]) or "business model revision" ([CKU11]) have been used synonymously.
The thus generate high degrees of uncertainty and complexity\(^3\) ([Bh16, KVO14]). However, originating in particular from the field of strategic management, research on BMT has not yet addressed the role management accounting and control systems (MACS) play within such transformation processes. This surprises for several reasons: As studies on BMT show, such change processes entail complex decision-making ([KVO14, VS13]) in particular about the question when to cannibalise an organisation's extant business model ([VS13]). Such decision-making is likely to rely on information provided by MACS ([KVO14, VS13]). Furthermore, MACS have been shown to play a crucial role for organisational and strategic change ([CM15, EGA13, QH01]).

This paper seeks to further the understanding of BMT by developing a tentative theoretical exploration of how MACS can be used to accomplish BMT. In doing so, it brings together research on BMT (originating in particular in the domain of strategic management and organisation studies) with research on MACS and strategic/organisational change (originating in particular in management accounting), i.e. two domains which have thus far not been related to each other. Based on a brief review of literature on both streams of research, the paper thus contributes to the literature by firstly providing a three-level framework of business model change that allows to analytically isolate the role played by MACS within BMT. It secondly identifies challenges for MACS use within BMT processes arising from the specific nature of such change. Thirdly, it theoretically develops three approaches for configuring MACS use within BMT and undertakes a first evaluation of how well each approach addresses the specific challenges of MACS use within BMT. Finally, issues for further research are being identified.

2 Previous Research

2.1 Business Model Transformation

Over the last decades, there has been a rapidly growing interest in business models (for overviews see [BH13, Db15, SSR14, ZAM11]). While most of the studies address business model innovations, a smaller but growing number of studies investigates the specificities of BMT ([Bh16, KVO14, VS13]). These studies show, that BMTs are highly distinctive as they entail a very high degree of uncertainty and complexity, require extensive resources, and thus pose particular challenges for managerial decision-making ([Aj13, Bh16, Ch10, KVO14]). Furthermore, this research presents evidence on how strategies for BMT are set ([Aj13]), how the change process affects organisational structure ([KVO14]), that BMT is accomplished through combinations of cognitive search and experiential learning ([Bh16, STV10]), and suggests generic patterns of BMT

\(^3\) The literature on business model change does not differentiate between complexity and complicatedness ([TS01]). The author gratefully acknowledges a comment from an anonymous reviewer pointing out that in most cases "complicatedness" is meant when this literature uses the term "complexity". As a more detailed analysis of this issue would go beyond the scope of this paper, the paper sticks with the terminology used in extant research.
processes ([CKU11, Cs14]). These studies have thus identified a number of organisational elements which are affected by and are actively used for BMT (technology ([KM15, MC04, SCM12]), organisational structures ([KVO14]), culture ([HCS15]) and leadership ([Cs14, DK10, SBT10]) and make first suggestions on mechanisms used for accomplishing these changes as well as on temporal sequence ([Cs14, Mfl14, MH15, VS13]). Moreover, a growing interest emerges in the role played by cognitive elements during processes of BMT, focusing in particular on business models as models ([IBM10, BM13, DL15]).

Only a few studies, however, have investigated the decision-making processes that drive BMT. These studies focus on executive cognitions ([Aj13]), and examine the challenges for decision-making processes that result from running extant and new business models in parallel ([VS13]). In particular, the study by Velu and Stiles ([VS13] shows that MACS are crucial for managing the ambidextrous tensions arising from BMT. Other research however has stated that BMTs essentially change the dominant logics and metrics of an organisation ([KVO14, Mr10, SCM12]). This poses a particular challenge for MACS and decision-making processes during BMT: Changing an organisation's dominant logic is likely to progressively dilute the validity of MACS as representations of this organisation's reality, that is to continuously weaken the usefulness of MACS for decision-making. As this will significantly increase the economic risk for organisations, a better understanding of MACS use within BMT processes seems vitally important.

2.2 MACS and Organizational/Strategic Change

MACS have been defined as "the processes of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of information that assists executives in fulfilling organizational objectives" ([HIS90]). They are thus highly powerful cognitive models, i.e. representations, of an organisation's reality ([Mp94]).

The relationship between (management) accounting and organisational as well as strategic change (e.g. identification of new business models or introduction of process management) has attracted much academic interest (for an overview see [EBN11, Gb08, QH01]). This research agrees in regarding (management) accounting as an important lever for accomplishing change and innovation ([CKS11, CM15]). Moreover, MACS have been shown to facilitate sensemaking ([DFO09]) and reduce complexity ([RM09]) by providing a stable, yet adaptive framework of reference ([DFO09, TA15]). By stimulating discussions and critical interrogation of the extant business ([EGA13]), MACS serve as a source for inspiration for innovation ([EGA13, MG11, Sr95]). And finally, MACS serve as "persuasive device[s]" ([RM09]) which help to establish particular changes within organisations ([Lb87, Lb99, Lj91]).

However, non of this research addresses the idiosyncratic characteristics of BMTs. In particular, there is a lack of research into how MACS are used during processes of BMT in order to deal with the complexities and uncertainties resulting from the ambidextrous tensions of BMT. This paper seeks to contribute to closing this gap by theoretically
exploring potential roles played by MACS within processes of BMT. By drawing in
particular on research on both MACS and organisational/strategic change, and research on
business model transformation, it brings together two until now unrelated streams of research.

3 Levels and Challenges of Business Model Transformations

3.1 Levels of Business Model Change

This paper suggests a three-level conception of business model change (see figure 1) in
order to reduce the number of organisational elements to be considered while at the same
time analytically isolating the interactions between MACS and and other organisational
elements. This conception is based on and extends conceptions by Berends et al. ([Bh16])
and Cavalcante ([Cs14]), which differentiate between "action" and "cognition"
dimensions ([Bh16]), and "process" and "representations" ([Cs14]).

<table>
<thead>
<tr>
<th>Third-level</th>
<th>Second-level</th>
<th>First-level</th>
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<tbody>
<tr>
<td>Routines, Culture, Leadership</td>
<td>MACS, (other) Cognitive models</td>
<td>Products/Services, Processes, Technology, Structures</td>
</tr>
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Fig. 1: Three-level conception of business model change

First-level change entails changes in the "real" world, i.e. addresses elements of an
organisation directly related to the organisation's value proposition ([OPT05]). Important
first-level elements are thus processes, goods and services, human resources and
technology (including information systems). Organisational structures will also be
regarded as a first-level element as they are highly intertwined with processes and
technology ([Ow92]). First-level elements thus more or less correlate with Berends et.al.'s
([Bh16]) "action" dimension of change. Second-level change entails changes of
"representations" of first-level elements. It thus addresses in particular the change of
models and knowledge ([Bh16, BQR07, QH01]), correlating with Berends et.al.'s
([Bh16]) "cognition" dimension of change. With respect to BMT, two types of models are
of particular interest: cognitive representations of the business model ([BM10, BM13,
CKU11, Cs14, DL15]), and (economic) models inscribed in MACS. To incorporate the
other elements of change which have been shown to significantly affect BMT processes

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4 This conception of change has some similarities to Stafford and Beer's "Viable Systems Model" (VSM,
[B84]). However, as changes in rationality/dominant logic are likely to affect many/all of the VSM's
elements, this paper proposes a slightly different view on organisations in order to facilitate the analytical
separation of effects resulting from change in rationality.
(in particular culture and leadership style), a third level is introduced, addressing in particular social relations, including emotions and power. Important third-level elements are thus routines, leadership style, culture, and (micro-) political interactions between actors.

The current paper focuses however on the relationship between first-level elements and MACS. The relationship between MACS and other second-level elements (such as the business model as a model ([IBM10, BM13]) as well as between MACS and third-level elements are worth further investigation in future research.

3.2 Challenges for MACS within Business Model Transformations

With respect to MACS change, BMT provides a number of specific challenges:

0. Radicality: The new and the extant business of a transforming organisation radically differ from each other ([KVO14, VS13]). This has been shown to result in fundamentally different dominant logics ([KVO14, Mr10]) requiring changes in the organisation's rationality ([QH01]) This has a twofold effect on MACS: Firstly, BMT is likely to require new sets of KPIs, reporting structures, etc., as MACS representing the extant business model will increasingly loose their validity as the change in business model unfolds. Secondly, this invalidation will force the organisation to build up new knowledge of how to use this data from new MACS.

1. Scope: As BMTs affect almost all elements of an organisation ([KVO14]), MACS, change cannot be limited to a few and specific KPIs, or parts of the organisation.

2. Uncertainty and extended duration: BMT processes are characterised by high degrees of uncertainty regarding the final business model configuration, the appropriate steps of the changes ([KVO14]), and whether the new model will be successful ([AD07, KM15]). Furthermore, most transformations will span over an extended period of time ([KVO14]). Therefore, it will be neither possible to design an MACS meeting the new business models requirements until the transformation has made significant progress, nor will any kind of "blueprint" be available.

3. Ambidexterity: Due to the disruptive nature of BMTs ([KVO14, Mc06, Mc13]), the established and the new business model exist simultaneously ([KVO14]). With the established model contributing significantly to the organisation's overall profitability in earlier phases of the transformation process and the new business model gradually increasing its relevance, the organisation will need to adapt its MACS accordingly and find a set of KPIs, reporting structures etc. that adequately represents both business models at the same time. The organisation's MACS will thus be required to handle ambidexterity ([Hn15, Mc13, MG11]).

4. Duality of Stability and Change: Research has shown MACS to have a dual function within change processes: providing stable frames of references which make decision-making processes possible ([DFO09]) and driving change ([BQR07,
QH01]. BMT thus leads to a dual challenge for MACS: While stability in MACS is pivotal for decision-making, the organisation needs to avoid the development of rigidities through the emergence of "cognitive inertia" ([Bh16]). The organisation thus has to balance both the risk of preventing change by sticking to extant MACS for too long (stability) and that of making wrong decisions due to changing MACS too early with not being able to use MACS data as a framework of reference.

5. Interdependence with information systems: As MACS are based on the analysis of operational and financial data, they require fine-grained transactional data. This data is usually provided (in particular within larger organisations) by powerful BI systems using data from ERP and finance systems. Changing these systems, e.g. to provide different KPIs, report in different structures, is thus often a tedious effort.

![Diagram](image)

**Fig. 2: Relationship between first- and second level change and representational gaps**

Taken together, BMT can be viewed as (at least temporarily) producing a significant gap between an organisation's reality and its representation in the organisation's MACS: Organisations firstly need to find a way of dealing with the loss of a valid framework of reference, i.e. dealing with representational gaps. This entails (a) gaps between first- and second-level elements (i.e. reality and representations; "type A gap" in figure 2) and (b) gaps within second-level elements (i.e. representations; "type B gap" in figure 2). Secondly, the organisation needs to decide when to make the changes to its MACS in order to close these representational gaps. Both issues are, however, highly interrelated, as representational gaps emerge through asynchronous changes of first- and second-level elements. These again can be driven by any of the six challenges identified above. As a result, MACS use within processes of BMT is, at its core, a question of sequencing of first- and, second-level changes.
4 Options for handling representational gaps and timing of change

Regarding the sequence of first- and second-level change, two approaches are theoretically possible: (1) iteratively oscillating between first- and second-level change or (2) choosing a sequenced order with one type of change dominating a first phase and being followed by the other type. The sequenced order can be subdivided into two approaches – first-level change being followed by second-level change, or second-level change being followed by first-level change. Overall, this generates three generic options for using MACS within processes of BMT to (see figure 3).

Fig. 3: Theoretical options for handling first- and second-level change

4.1 Approach 1: Iterating first and second-level changes

For an iterative use of MACS, the organisation will seek to synchronise changes of first-level elements (i.e. processes, structures, technologies, etc.) with those of second-level elements (in particular MACS). In other words, a change in one dimension (first or second-level) is directly followed by a change in the other dimension. An iterative approach would thus seek to minimise size and duration of representational gaps; i.e. allow for maximised trial and error learning while minimising uncertainty.

In order to achieve a minimization of representational gaps, frequent iterations are likely to be required, each involving a modest change from the previous state only. Thus, modest changes in processes and structures are being followed by instant adaptations to systems and MACS models, or vice versa. An iterative approach will therefore result in what Berends et. al. term processes of "drift" ([Bh16]): the organisation relies predominantly

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5 In some cases, a structural separation of extant and new business model ([KVO14]) with specific KPIs for each business model might be a possible approach. This paper focuses however on settings, during which a structural separation is impossible (e.g. in retail, where extant and new business model addresses the same customer).
on experiential learning; i.e. new iterations are based on experiences from previous iterations. Alternatively, the organisation can use cognitive search as a learning mechanism by theoretically defining what its processes will/should look like and design the MACS to serve this simulated process well, and then change its real processes to that inscribed into its MACS.

An iterative approach therefore allows an organisation to explore the uncertainties of radical business model change in a stepwise manner. As changes in reality are being reproduced in MACS within a short period of time, the organisation maintains a high validity of its MACS throughout the entire transformation process. At the same time, it prevents the fostering of cognitive inertia, as the MACS constantly change. Hence, this approach seems almost perfectly suited to conquer the dual challenge of avoiding rigidities while still supporting decision-making. Moreover, it significantly reduces uncertainties, in particular that of investing into a non-sustainable business model.

The approach does however, build on a number of assumptions: It firstly assumes that the new and the extant business model's rationalities are not incommensurable to each other, i.e. that first-level elements of both business models can be adequately represented by same (or at least non-conflicting) KPIs and other elements of the MACS. Otherwise, the organisation would be required to run a "dual" MACS consisting of incommensurable elements. As such a "dual" MACS will not provide a useful framework of reference for decision-making, the use of an iterative approach will be limited to less radical cases of BMT. Secondly, this approach will make great demands on the flexibility of the organisation's information systems, enabling continuous changes in both transactional and analytic systems. This will be difficult to achieve for larger organisations/business models. Hence, an iterative approach seems most suitable for younger and smaller organisations with more flexible information system architectures. Finally, this approach will lead to continuous change over an extended period of time. Such continuous perturbations, combined with high degrees of uncertainty and complexity over an extended period of time might overstrain many organisations.

4.2 Approach 2a: Focus on business (processes)

Choosing a sequential pattern of MACS use will lead to fundamentally different trajectories for the BMT process. Such an approach focuses on one of the levels of change first, with the other level being held constant for some extended period of time.

A first option for such a sequential approach is to postpone change of MACS until processes (and other first-level elements) have reached a fairly stable state close to the new business model. Only then MACS are being changed accordingly, re-establishing fit between reality and its representation. For the BMT as a whole, this will also lead to a "drift" pattern: Based on experiential learning, a specific trajectory of transformation will emerge over time. The approach differs however significantly from approach 1 in that the "drift" concerns predominantly first-level elements. Second-level elements will "lag behind" at first, and then leap forward, once MACS are being changed. In other words,
the approach minimises second-level change until the transformation of first-level elements has advanced quite significantly. This allows an organisation to focus its resources and management attention on developing the new business model's first-level elements, avoiding extended discussions about the representation of something, which is still evolving. Furthermore, the extant business model's rationality remains in place for a relatively long time. This reduces (initial) uncertainty, creates stability in frameworks of reference and avoids incommensurability of MACS elements. As major changes are only required once (and only after the new business model has significantly materialised), this approach also reduces demands on information system change, and seems thus significantly easier to implement.

However, implementing first-level change before second-level change is based both on condoning a widening representational gap and an increasing invalidation of its framework of reference. Furthermore, it privileges the extant business model. As a result, the new business model might seriously suffer from underfunding when investment is evaluated against the extant rationality and framework of reference ([KVO14, Mr10, VS13]). This might however be mitigated by provisionally setting up a separate reporting line for the new business model, i.e. drawing on structural separation for managing the resulting ambidexterity ([Mc13]).

Secondly, strong cognitive rigidities may result from limiting changes to second-level elements for a sustained period of time. This might however impede first-level change as it limits critical interrogation and discussion of the extant business model, which have shown to be important drivers for innovation ([EGA13, MG11]). Moreover, the lack of second-level change might hinder first-level change in a second way: Changes in first-level elements may require changes in culture and leadership-style (e.g. different leadership-styles required for knowledge-intensive work, c.f. ([Sd10])). As long as the "old" rationality is still in place (privileging the extant business model), such changes in culture and leadership-style may however be difficult to achieve. As a result, the organisation may not be able to attract the experts crucially required for the new processes.

Focusing on first-level changes first will hence crucially depend on a leadership style that ensures open-mindedness and drives transformation in order to counter the effects from keeping the extant rationality in place, i.e. to mitigate cognitive rigidities.

4.3 Approach 2b: Active use of MACS to drive transformation

Taking cognitive search ([Bh16]) as a starting point, leads to a distinctly different role for MACS within processes of BMT: Based on early and theoretical assumptions about the new business models future processes (and other first-order elements), the organisation designs and implements corresponding MACS (i.e. KPIs, reporting structures, budgeting and reporting processes) as well as necessary adjustments to information systems. A representative gap is thus actively created by setting new business model MACS as a standard for managerial decision-making early in the transformation process.
By radically changing the organisation's cognitive models and rationality, the approach seeks to actively use MACS as levers for BMT in order to speed up and facilitate change similar to what McCarthy and Gordon's term "feed-forward control orientation" ([MG11]). As the change in rationality will also provoke a swift change in processes, the organisation is likely to make a timely and radical shift in its business model. The approach thus follows the "leap" pattern identified by Berends et al. ([Bh16]).

By deeply inscribing the new rationality into the organisation at an early stage of the transformation, the approach is likely to create a very strong momentum. It thereby avoids the risk of underfunding the new business model and the creation of cognitive rigidities. As changes in MACS are likely to require adaptions to transactional information systems as well, the approach might even catalyse first-level change.

However, this approach does have a number of implications: Firstly, (radical) change in rationality at the outset of the transformation will result in an immediate invalidation of established knowledge of how to interpret and act upon MACS information. This will lead to a significant surge in uncertainty at the beginning of the entire change process, which will prevail until (new) knowledge of how to use the new MACS has been built up. Secondly, by privileging the new over the extant business model, the organisation will not only lack a valid framework of reference for managing its established business model, but also increase the risk to underfund the extant business and/or to cannibalise it too quickly. The approach thus increases economic risk during the transformation period. A third major challenge arises from uncertainty about the overall development of relevant markets and business models: "Leaping" forward by implementing second-level change early in a transformation process requires the organisation to make assumptions about the final configuration of its new business model when new MACS are being designed. If the "real" transformation (of first-level elements) is taking a different route from what had been expected when designing the new MACS, significant additional second-level changes will be required. This will not only lead to a further increase in uncertainty and demand further resources, but may strategically misguide the entire organisation by investing in non-sustainable assumptions on future business models.

Particularly strong leadership qualities will thus be required to balance ambidextrous rationalities (with processes being based on the extant rationality and MACS being based on the new rationality) during this pattern of BMT. Furthermore, the "double-abstrac-tion" (simultaneously conceptualising new processes and adequate representation in MACS) will be a challenging and arduous task for the organisation and its management.

5 Conclusions and Issues for Further Research

Processes of BMT provide a number of significant challenges for organisations. This paper has argued that particular attention should be paid to the role played by MACS during these processes. Moreover, it has identified specific challenges, MACS face during BMT. Three generic approaches for MACS use within processes of BMT have been theoretically
developed. A first exploration of these approaches has shown, that neither approach is able to simultaneously address all challenges equally well. While an iterative approach (approach 1) appears to provide an ideal solution at least in theory, incommensurability of rationalities and high demands on information systems' flexibility limit its practical applicability. The approach is thus likely to be more appropriate for less radical changes of business models in smaller organisations, or is constricted to smaller adjustments taking place in later stages of BMT processes.

Sequencing first- and second-level change yields two more theoretic options: By starting with first-level change (focusing on process change), an organisation chooses a more "usual" pattern of change which is less radical in the early stages of the process and minimises (cognitive) uncertainties and short-term economic risks. It is thus likely to be found in highly competitive environments (such as the retail industry). A strong leadership will be crucial to counter cognitive rigidities and to sustain open-mindedness. A much more radical approach is chosen if the organisation shifts from the extant MACS to the new MACS at the outset of change and even before changes in first-level elements have been (fully) implemented. While being able to create a much greater momentum of change, the approach entails a much higher degree of uncertainty and economic risk. It is thus most likely to be found in less competitive environments, or in organisations with highly developed analytical skills, which enable the organisation to make the necessary "double abstractions" without much effort.

This first theoretical exploration on MACS use within BMT reveals a number of issues for further research: First of all, it calls for empirical analyses of MACS use within processes of BMT. In particular, longitudinal and multi-case case studies are needed which provide empirical evidence on how management handles the loss of valid points of reference for decision-making resulting from radical changes in rationality. Moreover, such research might investigate how organisations accomplish the "double-abstractions" required for situations when second-level change precedes first-level change. Such studies might also reveal how choices of a particular approach to MACS use are made: Are these emergent phenomena ([MW85]), or acts of deliberate managerial choice? Finally, further research might elucidate whether the approaches differ with respect to the resources and skills required, and the type of organisations that fit the respective approach.

A second stream of further research might look into the relationship between different second-level elements, focusing in particular on the relationship between MACS and business model models ([BM10, BM13]). Potential questions might here be: How do quantified and formal representations (i.e. MACS) and business model models interact and shape each other? How could business model models be used to support MACS change during processes of BMT? Similarly, further research might reveal fruitful insights in how MACS and third-level elements such as leadership and organisational culture interact and make use of each other within processes of BMT. Finally, little is known about the ways information systems can both enable and constrain the use of MACS within BMT, and about the specific demands this generates for information systems.
Given the significant economic risks resulting from radical business model change, a more detailed analysis of these issues seems vitally important. Further investigations into these issues might however not only advance research on business models, but also further our understanding of the role played by MACS within processes of organisational change.

References


